SEP 16 1898 Vol 2 Con

THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. SEPTEMBER 15, 1898. CHICAGO, ILL. NUMBER 37

CLING-SURFACE AND MUCH MORE.

AN IDEAL BELT

CLING-SURFACE MFG. CO., 10 Court St., Buffalo.

The only reasons that higher prices are being constantly paid by the most prominent steam users in the United States for Cahall Boilers are—that they are better made, last longer, cost less for maintenance, show a higher efficiency and make drier steam than any other kind.

Send for illustrated catalogue.

Cahall Sales Department, Pittsburg, Pa.

THE HARRINGTON & KING PERFORATING CO.

Metals Perforated as Required

FOR SCREENS OF ALL KINDS FOR USE IN

Milling and Mining Machinery, Reduction and Concentrating Works, Woolen, Cotton, Paper and Pulp Mills, Rice, Flour and Cottonseed Oil Mills, Sugar and Malt Houses, Distilleries, Filter Presses, Stone, Coal and Ore Screens, Stamp Battery Screens, Brick and Tile Works, Filters, Spark Arresters, Gas and Water Works, Oil, Gas and Vapor Stoves, Coffee Machinery, Etc., Etc.

Standard Sizes Perforated Tin and Brass Always in Stock.

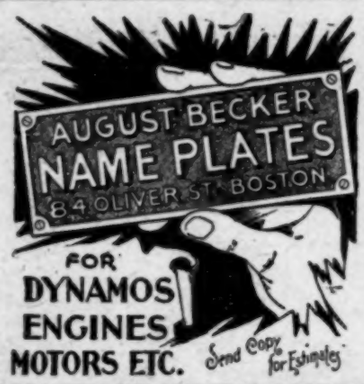
Main Office and Works: 226 North Union Street, Chicago, Ill., U.S.A.

Bristol's Patent Steel Belt LACING.

Most Perfect fastening for all kinds of Belting. Samples free.

THE BRISTOL CO., Waterbury, Conn.

IT PAYS to advertise in The Iron Trade Review.



APOLLO BEST BLOOM GALVANIZED IRON.

What is the standard galvanized iron?

Apollo.

Apollo Iron and Steel Company
Vandergrift Building
Pittsburgh, Pennsylvania

6

MINING ENGINEER, CHEMIST, ASSAYER.

BENEDICT CROWELL,
Atwater Building, Cleveland.

ENTERPRISE BOILER COMPANY
YOUNGSTOWN, O.

Draught Stacks, Blast Furnaces and Heavy Plate Work a Specialty.
Write for Estimates.

POWER TRANSMISSION
W. A. JONES FOUNDRY & MACHINE CO.
53-59 So. JEFFERSON ST. CHICAGO.

Are You Using Babbitt Metals?

If you want a strictly high grade anti-friction metal, try our "HIGH SPEED" Babbitt, at 18 cts. per pound, put up in boxes of 50 and 100 pounds. Once tried, always used.

SWARTS METAL REFINING CO., Anti-Monopoly House, 20 and 22 N. Desplaines St., Chicago, Ill.

TURNBUCKLES.

Cleveland City Forge & Iron Co.,
CLEVELAND, O.

Finished Case Hardened HEXAGON NUTS.

ODD SHAPES A SPECIALTY.

ANTHONY-BATES MACH. CO.,
Worcester, Mass.

LAKE SUPERIOR PIG IRON.

For Grey Iron, Malleable and Car Wheel Castings.

PURITAN

GENUINE CONNELLSVILLE COKE.

FORSTER, WATERBURY & CO.,
636-638 Rookery, CHICAGO

DICKMAN & MACKENZIE,

CLEVELAND, 71 Atwater Bldg. CHICAGO, 1234 Rookery Bldg.

Mining properties examined. Ores sampled at mines, furnaces and all lake ports. General analyses of Ores, Slags, Metals, Fuel, Foundry Materials and Products, etc.

CHEMISTS AND ENGINEERS.

Frank L. Crobaugh,

ANALYTICAL CHEMIST AND ASSAYER.

Ores sampled at lake ports, mine and furnace. Foundry mixtures a specialty. Experimental work conducted for manufacturers. General analytical and consultation work.

LABORATORY:
Cor. Superior and S. Water Sts., Cleveland, O.

FUEL GAS PLANTS.

American Gas Furnace Co.,
23 John St., N. Y.

W. S. ROCKWELL & CO.,

OIL FURNACES.

96 Cortlandt St., New York City.

See large Advertisement of

B. F. STURTEVANT CO.,
Boston, Mass.,
On Page 25.

BLOWERS, FANS, ENGINES.

WORKS, SHARON. MINES, CLEARFIELD CO., PA.

James V. Rose.

. . . PROPRIETOR . . .

SHARON FIRE BRICK WORKS,

Contractor in Fire Brick Construction.
Manufacturer of High Grade Fire Brick.

ANALYSIS:

Brick.		Rock Clay.	
SILICA,	54.50.	SILICA,	47.66.
ALUMINA,	44.30.	ALUMINA,	29.66.
LOSS ON IGN,	.05.	LOSS ON IGN,	13.90
IRON,	.15.	IRON,	.13.

SHARON, ... PA.

THE UPSON NUT CO., Cleveland, O.

. . . MANUFACTURERS OF . . .

MACHINE AND CARRIAGE BOLTS, HOT FORGED AND COLD PUNCHED NUTS, LAG SCREWS, BOLT ENDS, WASHERS, ETC. Catalogue and Prices on Application.

Headquarters for Blast Furnace, Foundry, Steel Works, Rolling Mill and Open Hearth Coke in the Connellsville Coke Region, Penn.

GENUINE CONNELLSVILLE COKE

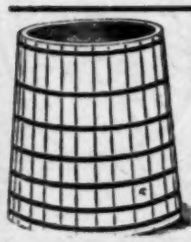
For Blast Furnaces and Foundry Cupola Work; also Crushed Connellsville Coke (substitute for Anthracite Coal) for manufacturing and domestic purposes. 13,500 Ovens. Daily Capacity 30,000 tons of Coke. Direct connections with all Railroads entering the Region. Quotations, Freight Rates, Pamphlets giving full information, promptly furnished on application.

Riveted Steel Pipe, Stand Pipes, Receivers.

WM. B. POLLOCK & CO.

with inquiry please give ad. No. 6. YOUNGSTOWN, O.

Blast Furnaces, Steel Plants, Boilers, Tanks, etc.



Red Cedar,

PINE OR CYPRESS.

Any Size, Any Shape.

WILLIAMS MFG. CO., Kalamazoo, Mich.

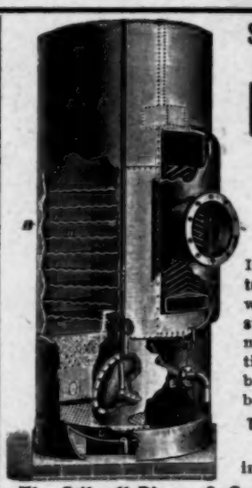
Miller, Wagoner, Fieser & Co.

PIG IRON, COKE.

Columbus, O., Hayden Bldg.
Chicago, Ill., Monadnock Bldg.
St. Louis, Mo., Bank of Com. Bldg.
Pittsburg, Pa., Hamilton Bldg.

Steel Stamps and Stencils.

FULLHARTY, J. H. & Co., Rubber Stamps Seals, Stencils, Automatic Check Punches and Numbering Machines. 92 Seneca St.



Stilwell's Patent Lime Extracting

Heater AND **Filter** COMBINED.

Is the only lime extracting Heater that will prevent scale in steam boilers. Removing all impurities from the water before it enters the boiler.

Thoroughly Tested.

Over 8,000 of them in daily use.

The Stilwell-Bierce & Smith-Vaile Co., Dayton, Ohio.

...A B C OF IRON...

A book for foundrymen. It is issued in cloth binding, and gives much valuable matter on how to reduec cost of mixtures, and on grading and numbering of pig iron.

CHAPTER HEADINGS:—Iron—What is it? Pig Iron. Constituents of Iron. Numbering of Pig Iron. Grading of Iron. How to reduce cost of mixture. Steel. Physical Properties of Metals Defined. Statistics. Early History and Manufacture of Iron.

Former Price, $2.00. NOW $1.00.

Sent postpaid on receipt of price by

The Iron Trade Review Co.,

CHICAGO. CLEVELAND. PITTSBURG.

Subscribe for THE IRON TRADE REVIEW, $3 per year.

12 Standard Types **AIR COMPRESSORS** with a large number of Special Patterns.

Covering the requirements of every application of compressed air. Each machine equipped with the most improved accessories relating to the economical production of compressed air. Send for new catalogue.

Rock Drills, Stone Channelers. | THE **Ingersoll-Sergeant** Drill CO., Cleveland, New York. | Coal Cutters The Pohle Air Lift Pumps.

Rockford Bolt Works, Rockford, Ill.

ALL KINDS OF

Bolts, Lag Screws, Rivets, Washers and Odd Bolt Work.

Mention the Iron Trade Review.

IT PAYS to advertise in The Iron Trade Review.

THE IRON TRADE REVIEW

Is an increasingly valuable medium through which to sell equipment to machine shops and foundries.

AIR COMPRESSORS

Thoroughly up-to-date and the most simple, durable and economical machines on the market. Built on improved lines.

ROCK DRILLS, AIR LIFT, PUMPS, ETC.

Send for catalogue

RAND DRILL CO.

100 Broadway, New York.
1328 Monadnock Block, Chicago.

O. TEXTOR,

Chemist and Metallurgist

Analyses made of Metals, Ores, Fuels and Supplies for Furnaces, Steel Works and Foundries. Ores sampled at mines, furnaces and lake ports. Advice furnished to operators of Blast Furnaces Steel Works and Foundries. Mining properties reported upon. For 12 Years Chief Chemist to the Cleveland Rolling Mill Co.

158 Superior St., CLEVELAND, O.

AIR COMPRESSORS

For every application of Compressed Air Power.

Complete Catalogue upon application.

Clayton Air Compressor Wks.

26 Cortlandt St., NEW YORK.

CABLE ADDRESS "METALFAC-CHICAGO" A.B.C. CODE

E. H. STROUD & CO.,

METAL FACTORS.

The Products of and Supplies for

IRON · STEEL · TIN-PLATE · BRASS COPPER · LEAD · & · ZINC · WORKS.

36 La Salle Street *100 William Street*

CHICAGO. NEW YORK.

THE ROBERT W. HUNT & CO.,

Bureau of Inspection, Tests and Consultation.

PITTSBURG: Park Building. CHICAGO: 1137 The Rookery. NEW YORK: 90 Broadway.

Reports on iron and steel processes and plants. Inspection of steel rails, splice bars, railroad cars, wheels, axles, etc. Chemical Laboratory—Analysis of ores, iron, steel, oils, water, etc. Physical Laboratory—Test of metals, drop and pulling test of couplers, draw bars, etc. Efficiency tests of boilers, engines and locomotives.

F. A. EMMERTON,

Analytical Chemist,

AND METALLURGIST.

Ores sampled at lake ports, mines and furnaces. Mines and Metallurgical Processes examined. Analyses made of Ores, Metals, Fuels, Railroad and Foundry Supplies, etc.

9 Bratenahl Building, CLEVELAND, O.

John T. Jones & Co.,

Mines, Prospects, Explorations and Mineral Lands, examined, experted, practical tests made and reported. Reliable and practical sampling done. Chemical analysis made. All work done by practical expert. Best of reference as to experience and reliability. Address

Suite 32, 115 Monroe St.,
MONTAUK BLOCK, CHICAGO, ILLS.

Millett's Patent

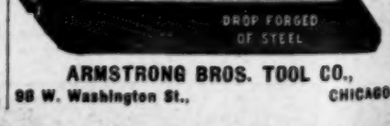
CORE OVEN.

The best in the world.

MILLETT CORE OVEN CO., Brightwood, Mass.

ARMSTRONG LATHE AND PLANER TOOL.

Saves Forging, Tool Steel, Time.
Send for Circulars to



ARMSTRONG BROS. TOOL CO.,
98 W. Washington St., CHICAGO.

THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. SEPTEMBER 15, 1898. CHICAGO, ILL. NUMBER 37

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

A lull in buying is noticed but no other abatement of the indications of strength in the situation. From the ore trade down to the consumers of foundry iron and of steel billets, the knowledge that comparatively little business is needed in the remainder of 1898 to maintain operations on a scale of comfortable expansion, is saving the market from the weakness of the few sellers who in any brief interval of quiet consult fears rather than facts. The pig iron stock statement shows a net decrease of 54,000 tons in August, coke irons decreasing 51,000 tons and anthracite 7,000 tons, while charcoal added 4,000 tons. This showing is particularly significant in view of the gain in pig iron production which on Sept. 1 was at the rate of about 3,000 tons a week in advance of the weekly rate on Aug. 1. Southern furnaces continue to ask relatively higher prices than those of the Central West and the East. In New England, Western New York irons find readier access than in many months. The export trade from Birmingham has been active, of late, one company booking 20,000 tons of export orders last week, including 2,500 tons of basic iron. Warrant stocks have been reduced steadily, but it is said the bulk of the stocks now in yards is held in large blocks by English and other capitalists who will not be sellers on the market. The feature in foundry irons is the heavy bookings of producers in all sections, many deliveries reaching well into 1899. Consumers of Bessemer iron appear to be generally well supplied for this year and little change in that market is looked for in the next few months. A meeting of valley furnacemen on the 17th will decide on the future policy as to production, but prices are considered to be at the maximum, so far as regulation by agreement is concerned. A small amount of outside iron has been sold at $10.55 Pittsburg in the past week. The billet market is firm, with few transactions, prices being maintained at $16 to $16.25 maker's mill, Pittsburg. Since much of the fall business has been placed in pig iron and steel, and producers are bound to be well occupied for the next three or four months, no marked change from to-day's prices is looked for in the balance of the year. The export trade is good in a number of finished lines, as well as in pig iron, advances abroad helping to offset the restrictive effect of higher prices at home. Chicago has received an export order for wire rods. Pittsburg has closed a noteworthy contract for rails—30,000 tons—to go to South Africa. While some railroad buying for 1899 is reported, no large business has been done as yet. The possibility of higher prices for rails when the new consolidated company becomes fairly operative is discussed. The railroads, through the sharp competition between Pittsburg and Western interests in the past 18 months, have had the benefit of prices out of relation to other products, and conceded to be needlessly low. Plate and structural mills, and latterly sheet mills, have been putting out an unprecedented tonnage, and bars continue to be the one exception to the general statement of firmness in finished material markets. It is reported that about 80 per cent of the tin plate mills have given options, running until February, to the proposed new company, promoted by Judge Moore and others, of the biscuit trust. Cash payment is called for in some cases; in others part cash and part stock. Only one member of the committee is connected with the tin plate trade.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World.*
808 TRADESMEN'S BUILDING, Sept. 14.

The situation is devoid of important incident. The general movement is steady. No rush is on in any line. Prices are being maintained without any difficulty and the fact that the fall business is about placed gives force to the opinion that no radical changes will take place in the remainder of the year. The most important order of the week is for 30,000 tons of standard steel rails for shipment to Cape Colony.

PIG IRON.—Nothing has happened to cause the market to move either way. On Bessemer iron, $10 is being netted by valley furnacemen, but Pittsburg prices are $10.50 to $10.55, indicating both that the small amount of local iron sold is not on valley basis and that some freight concessions are obtainable. Gray forge is quoted from $9 to $9.10 valley and $9.35 to $9.45 Pittsburg. There is some movement but nothing exceptional and quick shipments have been a shade lower than last week. Foundry irons are in fair demand, No. 2 being quoted from $10.15 to $10.25.

Bessemer, valley furnace	$	10.00
Bessemer, Pittsburg	10.50 to	10.55
No. 1 Foundry	10.50 to	10.65
No. 2 Foundry	10.10 to	10.25
No. 3 Foundry	9.65 to	9.85
Gray Forge, valley furnace	9.00 to	9.10
Gray Forge, Pittsburg	9.35 to	9.45

BILLETS.—The current of trade has been sluggish. What business has been done has commanded from $16 to $16.25 makers' mill. Sheet and tin plate bars have a good market and continue rather scarce. They are quoted from $17.75 to $18. Rods are scarce. The breaking of a shaft at one of the mills causing a shut down until next week will further curtail production. The quotation continues firm at $22.

IRON AND STEEL SKELP.—The week has been uneventful. Prompt deliveries cannot be had on account of the crowded condition of the mills. Prices are as follows: Grooved iron skelp, 1.10c to 1.12½c; sheared iron skelp, 1.17½c to 1.20c; grooved steel skelp, 1.02½c to 1.05c; sheared steel skelp, 1.10c to 1.12½c.

PIPES AND TUBES.—Business continues excellent. All the mills are crowded and prompt deliveries are still reported out of the question. What new business is taken commands the new prices. The additional discounts are six tens for less than carload, and six tens and two and a half per cent off for carload lots. Base discounts are as follows: Butt weld, black, 55 per cent off; lap weld, black, 65 per cent off; butt weld, galvanized, 47½ per cent off; lap weld, galvanized, 52½ per cent off. Discounts on merchant boiler tubes are as follows: 2¼-inch and smaller, 72½ per cent off; 2½ inch and larger, 75 per cent off. Inserted joint casing is now quoted at 60 off and screw and socket joint casing at 60 and 10 per cent off.

SHEETS.—The sheet manufacturers are shading the new prices somewhat. There is a good movement in both black and galvanized sheets. Both demand and prices are propor-

tionately better for the wider guages. No. 28 is quoted at from 1.95c to 1.97½c, and galvanized sheets are quoted from 80 and seven and a half to 80 and 10 per cent off list with 15 to 18 cents freight.

STRUCTURAL MATERIAL.—Small orders keep coming in, in good numbers and specifications for past orders are also coming in, thus keeping the mills very busy. Prices are as follows: Beams and channels, 3 to 15 inches, 1.20c; 18 to 24 inches, 1.30c; tees, 1.25c; zees, 1.20c and angles 1.10c. Universal plates alone at 1.15c; with other shapes 1.05c.

SPIEGEL.—Demand is quiet and prices are steady at $23.50 to $24.

FERRO-MANGANESE.—The quotation is still $50 for 80 per cent domestic delivered.

PLATES.—The fact of the mills being very full has caused some foreign orders calling for delivery through this and next month to be turned down, as the delivery could not be made. The buying is general and tonnage is good. The local mill making acid open-hearth steel plates is quoting universal plates at 1.20c and sheared plates at 1.40c. Other prices are as follows: Tank, 1.15c; shell, 1.20c; flange. 1.25c; fire box, 2c and upwards.

RAILS AND TRACK MATERIAL.—The conditions of last week are unchanged. The price of light rails is from $19 to $19.50 and that of heavy sections $18. Track material is in good demand, with prices as follows: Links and pins, 1.20c; iron track bolts, 1 65c to 1 70c; splice bars, 1.10c to 1.15c; spikes, 1.40c to 1.45c. The local mill has booked 30,000 tons the past week, for shipment to Cape Colony, South Africa.

SPELTER.—This product has continued to rise both here and abroad. The q otation here is from $4.90 to $4.95.

OLD MATERIAL.—The fair business in old material continues. The gradual depletion of the supply of old iron rails, with no new iron rails being rolled, is leading to a gradually increasing scarcity and a tendency to stiffen the price is apparent. Among the week's sales are 1,000 tons of iron rails at $13.75 and 1,000 tons steel rails at $10. Other materials are quoted as follows: Heavy steel scrap, $10, net; car wheels, $10.25, gross: Cast borings, $6; railroad cast scrap, $9, gross; No. 1 wrought scrap, $11.50, net; iron axles, $6, net; steel axles, $12.50, gross; charcoal scrap, $10, gross; billet and bloom ends, run of mill, $11; busheling scrap, $9 50 net; machinery scrap, $9, gross; wrought turnings, $6.75, net, valley.

CHICAGO.

OFFICE OF *The Iron Trade Review and Industrial World.*
1522 MONADNOCK BLOCK, Sept. 14.

There continues to be a heavy demand for steel of all kinds, and mills are having considerable difficulty in meeting shipping requirements in many cases. The local mills report sales of about the amount of their output every week, thus keeping sold ahead just about the same amount all the time. Sales of pig iron are still only moderate, although there is a slight increase in the demand. The final arrangements for the consolidation of the Illinois Steel Co., the Minnesota Iron Co., the E. J. & E. Ry. Co, and for the purchase of the Lorain Steel Co. have been made, according to a circular mailed to the stockholders of the respective companies the first of this week, as noted elsewhere in this issue.

PIG IRON.—The week shows very little change either in sales or inquiries. If anything, there is a slight increase in the demand. No very large sales were made, and few large transactions are being figured upon at present. The foundries continue to run full, and are taking iron as fast as the furnaces can make shipments. The market is very firm, both for Northern and Southern irons, but no changes have been made in quotations.

Lake Sup. Charcoal	$11 50 @ $13 00	Southern Coke No. 3	$ @ 10
Local Coke Fdy. No. 1	11 50 @ 12 00	Southern No. 1 Soft	10 85
Local Coke Fdy. No. 2	11 00 @ 11 50	Southern No. 2 Soft	10 60
Local Coke Fdy. No. 3	10 75 @ 11 00	Southern Silveries	11 25 @ 11 50
Local Scotch Fdy. No. 1	11 50 @ 12 00	Jackson Co. Silveries	12 50 @ 14 50
Local Scotch Fdy. No. 2	11 00 @ 11 50	Ohio Strong Softeners	12 00 @ 12 50
Local Scotch Fdy. No. 3	10 75 @ 11 00	Alabama Car Wheel	15 00 @ 16 00
Southern Coke No. 1	10 85	Malleable Bessemer	11 50 @ 12 00
Southern Coke No. 2	10 60	Coke Bessemer	11 50 @ 12 00

BARS.—There is a considerable demand for both iron and steel bars, and sales of a heavy tonnage were made last week, including several good sized orders. The demand is principally from wagon and carriage makers and implement manufacturers, but other consumers are buying large quantities. The market is very firm, and while 1.05c is done in some cases on common iron, 1.10c is a more frequent quotation, and mills are getting the higher figure in many instances. It is only on the most desirable specifications that the bottom figure is made. Guaranteed iron is quoted at 1.15c to 1.20c, and soft steel bars at 1.10c to 1.20c.

RAILS AND TRACK SUPPLIES.—The local mills made sales of about 5,000 tons of heavy sections in the week, nearly all of them for delivery the last part of this year. There is expectation of a very heavy demand for standard sections this year, and the roads are expected to place their orders earlier than usual. It is thought that buying in quantities will commence within a short time. Some roads are already figuring on their needs for the coming year. Quotations are as follows: Rails, $20 to $22.50, according to specifications; steel splice bars, 1.15c to 1.25c; track bolts with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.50c to 1.60c.

BILLETS AND RODS.—No sales of billets were made last week in this market. They are still quoted at $16.50. Rods are in good demand, and sales of 1,000 tons for export were made by the local mills. They are quoted at $22.50.

CAR ORDERS.—There is a continual run of orders for small lots of cars, but no large contracts have been placed lately. The demand for car material of all kinds is heavy, and orders are coming in every week for good quantities.

PLATES.—There is an excellent call for plates, and several good contracts were closed up last week, making a total somewhat in excess of the week previous. The mills are full of orders, and are very firm in their views. Quotations are made as follows: Tank plates, 1.20c to 1.30c; flange steel, 1.30c to 1.40c; fire-box steel, 1.85c to 5c.

STRUCTURAL MATERIAL.—While no large contracts were placed in this market last week, it was one of the best weeks of the season, so far as the tonnage is concerned. A large number of small orders were placed, the demand coming from all classes of consumers. Considerable small bridge work is in progress, and a large number of small buildings are being put up all the time, taking considerable quantities of material. Quotations are very firm, and are unchanged: Beams, 15 inch and under, 1.35c to 1.40c; 18-inch and over, 1.45c to 1.50c; angles, 1.25c to 1.30c; plates, 1.20c to 1.30c; tees, 1.40c to 1.45c; zees, 1.35c to 1.40c. Small lots from stock are quoted at ¼c to ½c higher.

SHEETS.—There is no change in the situation. The demand for both black and galvanized sheets is large, and sales from mill and from store are fully up to the expectations of the agents. The market is firm at 2.10c to 2.15c for black and 80 and 5 per cent discount for galvanized.

MERCHANT STEEL.—The demand is heavy and sales last week were fully as large as the mill agents desired. Mills are holding firmly to their prices, and in some cases are asking more than the figures we quote. Quotations for immediate acceptance are as follows: Open-hearth spring, tire and machinery steel, 1.65c to 1.75c; smooth finished machinery steel, 1.60c to 1.70c; smooth finished tire, 1.50c to 1.60c; tool steel, 5 50c to 7.50c; specials, 11c and upwards.

SCRAP.—There is still only a small demand for any grade of scrap, and dealers are not looking for any increase in the immediate future. Prices are unchanged, and are inclined to be a little higher. Dealers' selling prices are as follows:

Old iron rails, gross	$12 50 @ $12 75	Axles, net	$14 25 @ $14 75
Old steel rails, long, gr.	10 50 @ 11 00	Cast borings, net	4 25 @ 4 50
Old steel rails, short	8 75 @ 9 00	Wrought turnings, net	6 00 @ 6 50
Old wheels, gross	11 00 @ 11 50	Axle turnings, net	7 00 @ 7 75
Railroad forge, net	11 50 @ 12 00	Mixed steel, gross	7 25 @ 7 50
Dealer's forge, net	10 00 @ 10 50	Stove plates, net	5 75 @ 6 00
No. 1 mill, net	7 50 @ 8 00	Heavy melting steel, gr.	8 25 @ 8 50
Heavy cast, net	8 50 @ 9 00	Old iron splice b., net.	12 75 @ 13 00
Malleable cast, net	8 00 @ 8 50		

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World.*
27 VINCENT ST., Sept. 14.

Sales of ore are being made week by week, though in no instance in large amounts. Selling firms, in some cases, are encountering difficulties in the complete fulfillment of contracts, and on Mesabi ores deliveries amounting to several hundred thousand tons will be carried over. Labor has not been plentiful at any time in the season, on Lake Superior, and latterly has been so scarce as to require the cutting down of some calculations as to output. High authority in the ore trade has made estimates, in view of these conditions, which put the season's total quite below the 14,500,000-ton mark that has been mentioned as a possibility for the season. Official

figures for August shipments give a total of 2,323,562 tons, as against 2,296,578 tons in August of last year, and a total to Sept. 1, of 9,142,149 tons, as compared with 7,712,138 tons, an increase of 1.430,011 tons. It is predicted that September shipments will fall short of last year's, and that the remainder of the season will not show the relative increase over 1897 that appears in the May-August statement, since large stockpiles were moved in the first half of the season, and many properties have cleaned up quite thoroughly their accumulated ore. The freight rate from the head of Lake Superior has moved up to 55 cents the past week, with 50 cents paid from Marquette and 45 cents from Escanaba. The grain movement, which is expected to exceed that of 1897, is steady and, in view of the conditions in ore, not likely to make any considerable change in freights this month.

PIG IRON.—A committee meeting of the association of Bessemer pig iron producers has been held in the past week and a general meeting will be held on Sept. 17. For the present the wants of steel works are supplied and the week has been a quiet one with furnacemen. The price of $10 is uniformly quoted by valley producers, but on one or two small lots, on which deliveries were due dealers on trades, it is reported $9.90 to $9.95 was realized. Cleveland foundries have been rather scant buyers of late and Northern Ohio inquiry has been light. In spite of the large volume of shipments by foundry furnaces generally, an inquiry for several hundred tons develops some seller who is weaker than the average market. Furnaces have maintained $9.50 on No. 2 iron and some have asked $9.75, but $9.40 in the valley has been done. Southern iron is not a marked competitive factor; furnaces in that section are firm and united. Gray forge is still quoted $9 and $9.10 valley furnace, and sales have been made at each of these figures; for quick delivery a transaction at a shade lower is reported. Lake Superior charcoal is firm, and an advance has been made by one seller. We quote f. o. b. Cleveland:

Bessemer,	$10 65	Valley Scotch No. 1	$10 65
No. 1 Strong Foundry	10 40@10 65	Valley Scotch No. 2	10 15@10 40
No. 2 Strong Foundry	10 15@10 25	Gray Forge	9 50
No. 3 Foundry	9 65@ 9 90	Lake Superior Charcoal	11 50

BILLETS AND RODS.—In the absence of transactions in billets, we quote $16.25 to $16.50, Cleveland, and no material to be had on short deliveries. Sheet bars are quoted $18.25 for early delivery and $17.75 for first half of 1899. Rods are nominally $22.

FINISHED MATERIAL.—In general it has been a quiet week. Inquiries for rails—one for 4,000 tons of 60-pound T's for an electric line and one for 550 tons for an electric extension—represent the largest tonnage of the week. The structural material demand is in small lots, at the 1.20c basis, Pittsburg, for beams and channels up to 15 inches. Plates are 1.15c to 1.20c Cleveland, for tank, with acid open hearth quoted higher. Steel bars are based on 95c Pittsburg, and are sold in small lots at 1.02½c Cleveland. We quote bar iron at 1 05c Cleveland, out of stock. Sheets have been in excellent demand, on a basis of 1.92½c to 1.95c Pittsburg for No. 27 in small lots.

CINCINNATI.

Sept. 13.

There are a number of large inquiries for Southern iron on which sellers are figuring, but it is reported to be impossible to close the business that offers at present figures. There is a good deal of small buying at full prices. The buyers of Southern iron are said to be making no concessions. There is still considerable difficulty in getting iron forward on contracts fast enough to suit the views of consumers. The largest interest in Birmingham reports a great increase in the inquiry from abroad. Last week this one interest sold over 20,000 tons of iron for shipment across the Atlantic, one particular lot being 2,500 tons of iron cast in chill molds for use in the basic open-hearth furnace. The prices obtained for foreign shipment are averaging better than the prices asked at the present time from the domestic trade. This situation makes the Birmingham iron masters unusually strong and dealers report that they will not shade prices for home business no matter how desirable. The Southern furnaces are beginning to fear that the usual car famine will be more acute than customary. Lake Superior coke irons are moving along steadily without any change in price, but Lake Superior charcoals are firmer, one of the most important producers having advanced prices again 50 cents per ton. We quote f. o. b. Cincinnati. Southern coke No. 1 foundry, $10; No. 2, $9.75; No. 3, $9.25; No. 4 and gray forge, $8.75; mottled, $8.75; No. 1 soft, $10; No. 2, soft, $9.75; Tennessee charcoal, No. 1, $12.50 to $13; Hanging Rock charcoal, No. 1, $14.50 to $15.50; Jackson Co., silvery, No. 1, $12 to $12.50; standard Georgia car wheel, $14.25 to $15.

PHILADELPHIA.

Sept. 13.

Shipments of pig iron are the heaviest known for years and as the iron is rapidly used in the requirements of trade, the business is known to be on a sound basis. Buying is not urgent, as consumers are not in immediate need of making new purchases and would rather wait than pay the advances that would come with a heavy buying demand. It is expected that conditions will remain in about the present shape for some weeks, since much of the fall buying has been done. We quote No. 1X at $.1.50 to $11.75; No. 2X at $10.75 to $11.25; No. 2 plain, $10.50; standard mill iron, $10.25 to $10.40; ordinary mill iron, $10; basic iron, $10.25; Bessemer, $12 to $12.50. Eastern Pennsylvania and Virginia irons are taking business as against Birmingham brands. Billets are held firmly at $18, and prompt deliveries are very difficult to get. Plate and structural mills are full to their utmost capacity, and Eastern mills, preferring to hold themselves in readiness for future small-lot orders, have lost some recent large business on which lower prices would have to be quoted. Sheets are now quite as strong as plates and shapes, bars being the only line in which the supply of work is not crowding capacity. We quote tank plates at 1.30c and 1.35c; flange steel at 1.50c to 1.55c; angels, 1.30c to 1.35c; beams and channels, 1.40c to 1.50c; steel bars, 1.20c to 1.25c; refined iron bars, 1.15c to 1.20c. In old material prices seem to be working gradually to a higher level. Buyers contest the advance, but prices are about 25c a ton above figures of 10 days ago. We quote old iron rails at $12.25 to $12.75; old steel rails at $10.50 to $10.75; old car wheels, $10.25 to $10.75; No. 1 yard scrap, $10.50 to $11.

BUFFALO.

Sept. 13.

Rogers, Brown & Co., report: "The quite general firming up of prices and the material advance made by some has had the natural effect of stopping, to quite an extent, the sale of large amounts of foundry iron in this district. This state of affairs was looked for and doubtless will continue for a little while, or until the weaker furnaces find their order books more comfortably filled and follow the lead set by the others. Shipments continue at a very heavy rate and the most popular brands and grades are in such demand that sufficient amount cannot be furnished to keep all supplied. We quote for cash f. o. b. cars Buffalo: No. 1 strong foundry, $11.25; No. 2, strong foundry $10.75; Ohio strong softener No. 1, $11.25; Ohio strong softener, No. 2, $10.75; Jackson Co. silvery, No. 1, $14; Southern soft, No. 1, $11.75; Southern soft, No. 2, $11.50; Lake Superior charcoal, $12; coke malleable, $10.75."

THE stores of the Prentiss Tool & Supply Co., at Chicago and Cleveland passed, on Aug. 15, into the hands of the Marshall & Huschart Machinery Co., a new concern composed of several well known machinery men. The general manager of the new company is Alfred Marshall, who has been manager of the Western business of the Prentiss company for the past eight years. Mr. Marshall will make his headquarters at the Chicago store, 62-64 S. Canal st. Frank M. Huschart, formerly treasurer of the Roth Packing Co., of Cincinnati, has become connected with the new company, and will be at the Chicago store. Fred A. Geier, of the Cincinnati Milling Machine Co., of Cincinnati, O., is vice-president of the new concern, but will not take active part in the management. The Cleveland store of the Marshall & Huschart Co. will continue under the management of H. C. Elliott, who has had the same position with the Prentiss company. The new company will carry a complete line of tools and machinery, and is now making arrangements to increase the number of manufacturers for whom it is agent.

THE Minnesota Iron Co. has declared a quarterly dividend of 1¼ per cent payable Oct. 15.

THE IRON TRADE REVIEW
AND
INDUSTRIAL WORLD.

DEVOTED TO MACHINERY, METAL-WORKING AND FOUNDRY TRADES AND IRON AND STEEL MANUFACTURE.

PUBLISHED EVERY THURSDAY BY
THE IRON TRADE REVIEW CO.,
CLEVELAND, OHIO.

CLEVELAND, 27 VINCENT STREET.
G. H GARDNER, President. A. I. FINDLEY, Editor.

CHICAGO:
1522 MONADNOCK BLOCK.
B. M. GARDNER, Associate Editor and Western Manager.

PITTSBURG:
808 TRADESMEN'S BUILDING.
J. B. ALLEN, Manager.

Subscription (strictly in advance), $3 per annum. Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

SEPTEMBER 15, 1898.

WAGES AND SOMETHING MORE.

When the large extra dividend paid to stockholders of the Pullman Palace Car Co. was announced recently, an employe of the concern wrote for a Chicago paper a comment that doubtless reflects the thinking of many others. After asking whether the men who had worked for years, helping to build up the great surplus, had no claim to a share in it, he suggested these things as features of a future policy: Pensions for some of the "old, bent and crippled hands;" a fund from which just claims might be paid, instead of the requirement that the men sign a paper relieving the company of all pecuniary responsibility; the establishment of a hospital where disabled hands could have medical and surgical aid; a reduction of house and water rents and an advance in wages. This sounds like an elaborate programme; but it is not surprising that the men's ideas of what is their due should assume large proportions in view of the division of such a prodigious surplus so soon after the great strike and the defense then made for the reductions in wages.

There may be those who do not or will not recognize such a tendency; but it would seem that under the present industrial regime there will be a larger introduction of features guaranteeing to the employe certain benefits in addition to the wage fixed by competition in labor. In his excellent presidential paper before the Lake Superior Mining Institute last month, Mr. Wm. G. Mather, president of the Cleveland-Cliffs Iron Co., made this reference to the changed conditions under which the benefit system is finding a place in our industrial organization:

> In earlier times when industrial plants were the property of one man, or of two or three associated as partners, and when the owner himself was frequently the manager, he lived closer to his men and a bond of kindliness and interest was often in effect, which filled the function of the benefit methods now used, and which naturally disappeared when corporations arose, managed often by men whose principal financial interest in the company was their salary.

The great and highly organized corporation, formed often by the merging of smaller ones; the elimination of the personal element in ownership, to the extent that employes often connect no individual with the plant as proprietor, knowing only the exacting foreman or superintendent; the loss of the element of respect for an employing man among men, daily in contact with his employes and known to carry heavy burdens growing out of the effort to give them regular employment — these conditions are responsible in part for the antagonisms between capital and labor of which there have been so many marked exhibitions in recent years. In the paper referred to above President Mather pointed out in detail how the iron mining companies of Lake Superior, even from a selfish and pecuniary standpoint, would find it desirable to interest themselves in benefit funds and special organizations and methods in behalf of their employes. In the same connection he expressed his personal conviction that larger opportunity and advantage carried with them larger obligation, taking the view that something more is involved in the relation between employer and employe, than so much wage for so much skill and muscle. The paper pointed out that good health, intelligence, contentment and industry should be encouraged, and that sickness, accidents, ignorance and restlessness should be overcome to the largest possible extent. Relief and pension funds, health service, good housing, workingmen's life insurance associations, co-operative distributive stores, schools of all kinds, schemes of recreation, etc., were suggested as methods that had been cultivated with good results by many employers, particularly in Europe.

We know there are those who, putting the earning of dividends as first among the objects of corporate existence, consider that these methods belong in a province apart from business; that they partake rather of sentiment and paternalism than of the discipline and close calculation of the modern business proposition; and that there is a suggestion of laxity in them that does not agree with the rigid regime demanded to-day if profits are to be earned. It is true that a company which does not earn dividends, cannot long be in a position to contribute to benefit funds or to help its employes by supporting or forwarding improvement agencies. But theory and practice both come to the conclusion that while not to be undertaken with the cold calculation that two dollars will be returned for every dollar expended, or even that somehow every scheme of the kind will pay its way, the advantages from every standpoint, of thus lubricating the bearings of the industrial organization, argue for larger use of co-operative expedients.

It is true that a great company, whose operations mean the turning over of millions annually, as with many of the Lake Superior mining companies, is in better position to carry out benefit and improvement plans than a small concern. The number of employes is large and the expenditure, set against a large output, amounts to a small unit charge. The fact that mining companies own large tracts of land, and thus are interested in making their employes home-owning, or, where they are tenants,

in having a thrifty, orderly, intelligent community, makes many features of the plan outlined in Mr. Mather's paper possible to them, while impracticable of execution in connection with a single shop, which is only one of many industries in a community. Yet a conspicuous success in the latter class is the unique organization of the National Cash Register Co., of Dayton, O It is the very exceptional position of ihis system that goes far towards making it successful. If it were common, perhaps the incentive of the employes to make it a conspicuous success would be removed. Its feature of management by committees of employes may not be feasible, but its Advance Club, its premiums for workable suggestions from employes, its various improvement societies, its prizes for well kept gardens and premises, its noon lunch at a cost of one cent, its draughting and other classes, and its benefit and insurance features—all these, it would seem, could be adopted elsewhere, at least in part and with proper modifications. A correspondent of *Machinery*, who recently visited the plant, with its 1,400 hands, admits at the outset: "I was cynical enough to think it was a grasping monopoly, wearing a shallow mask of pretended philanthropy and was alert for any little indications that would enable me to penetrate the deception and read the expression of the face behind it." He shows, in a plain statement of what he saw and learned, that this predisposition was entirely dispelled, and begets in his reader a sympathetic interest in the scheme and the splendid results it has achieved.

While the American workingman has little tolerance for institutions like Pullman, which are odious for an assumed philanthropy, and does not take kindly to schemes that smack of paternalism, certainly there are some phases of the European system which would be well received in the United States, if the communication from which we quoted at the outset, is any criterion. Europe has given us examples in many respects worthy of careful study. Government guarantee of old-age pensions, as in Germany, is one excellent provision of this sort. The plan has done wonders in the Fatherland, where an industrious young man begins to realize that 30 years of solid work mean protection in old age. The British Parliament, in passing, a few months ago, the Workman's Compensation Act, practically set aside the law of "common employment," under which the principle was recognized that accidents are liable to occur in all occupations, even with careful management, and that an employe voluntarily assumes the risks incident to such occupation. Whereas formerly no action for damages could be maintained against an employer unless neglect of his statutory duty were proved, now there is no release of employer's liability for accident to workmen, unless wilful intention or culpable negligence can be shown on the employe's part. The new enactment thus confers a new benefit upon employes and is in sharp contrast with the Pullman requirement, referred to above, that the employe sign a release of any claim for damages by reason of accident. The practical effect of the new law is to compel employers to carry all the accident insurance upon their employes, instead of paying half of it, as many have done under the mutual benefit systems heretofore widely in vogue.

As manufacturing organizations in the United States approach more nearly to the type that promises permanence—that of the large corporation, complex and highly systematized—we shall expect to see more attention given to these problems than has been possible in the periods of pioneering and of rapid industrial expansion, in the last two generations.

WHY the bituminous coal miners of tne Middle West have struck repeatedly, in the past 10 years, and are likely to keep on striking for as many more, is indicated in the synopsis printed in these columns last weeek, of the annual report of Chief Mine Inspector Haseltine, of Ohio. The average daily wages of miners in the 150½ days mines were in operation last year were $1.27, and the average yearly wages were $192.05, as compared with $221.55 in 1896. The simple truth about the bituminous coal industry is that twice as many mines are operated as the country needs. Employment for but one day out of two was given last year to the men unfortunate enough to be dependent upon these mines for their livelihood. The poorest paid adult hand about any shop or factory in the country was able to earn nearly twice as much last year as the average miner in the coal diggings of Illinois, Indiana, Ohio and Pennsylvania, for the Ohio condition is only typical of the whole industry. The worst feature of all is that little or no improvement can be expected until a large percentage of coal mine operatives get out of the business. There is no comfort in such a prescription, it is true, but the disagreeable fact is to be faced. Between the machine and the determination of every owner of opened coal property to get out all the tonnage he can market by cutting under his competitor's price, there is a pitifully small chance for the coal miner, agitate and combine and strike as he may. His only salvation is in quitting the job.

Personal.

Geo. H. Schuler, Cleveland district manager for the American Steel & Wire Co., resigned his position last week. His successor is A. T. DeForest, formerly secretary of the HP Nail Co., and latterly assistant manager, Cleveland district, of the consolidation. E. T. Schuler, of Chicago, treasurer of the American Steel & Wire Co., brother of Geo. H. Schuler, has also resigned, as has their father, H. B. Schuler, of Chicago, a director of the company. Another change in the official list of the company is the return of Frank Baackes, of Salem, O., to the position of general manager. Mr. Baackes resigned this office last month. It is announced that these changes signify no alteration of the company's policy relative to the strikes at Cleveland mills. Two employes of the Washburn-Moen Mfg. Co. have resigned—T. H. Taylor, general salesman, and Robert Nye, superintendent of the Waukegan plant—to enter the service of the American Steel & Wire Co., in charge of the department of specialties of the Cleveland mills.

H. C. Edwards has resigned as manager of the Illinois Iron & Bolt Co., Carpentersville, Ill., and is succeeded by John Fierke.

OTIS, HOUGH & Co., Cuyahoga Bldg., Cleveland, have the agency for Ohio for the plates and forgings of the Otis Steel Co.

SOME LARGE CRANES.

The crane service of the American Steel Barge Co., of West Superior, Wis., and the great gantry crane employed in the beam yard of the Cambria Iron Co. are notable examples of the satisfactory solution of problems involved in the rapid and economical handling of materials by machines commanding large yard areas. Both were designed and erected by the Wellman-Seaver Engineering Co., of Cleveland, to whom we are indebted for the accompanying views. The gantry crane in the Cambria Iron Co.'s yards at Johnstown, Pa., was described in detail in these columns, when it was under construction. It is of special interest because of its great span, being 200 feet in the clear, center to center of tracks which the crane traverses. The crane is driven by electric motors, the hoisting gearing being arranged in a trolley which travels on a track suspended from the under side of the trusses. To this trolley is attached the operator's cage, enabling the operator to have a clear view of his work at all times. The problem of wind stresses was one that required special study in the construction of the trusses. The crane has been in hard and steady service since its completion last year.

The crane service of the American Steel Barge Co., at West Superior, consists of an elevated steel track, extending the full length of the ship yard between two building berths. Mounted on this runway, and traversing its full length, is a cantilever gantry crane. By means of this arrangement, the material is transferred from the end of the yard, where it is delivered to the shops, out to its place on the vessels with a very small amount of handling, and a great saving in labor is secured. The runway is of a very massive type, as shown in the illustrations, being well braced to withstand the strains caused by the crane. The lower portion of the runway is arched, the intention being to lay a railroad track down through the center. From this track the material can be picked up by the crane and run out to ships.

A point of interest in the construction of this crane is the double runway between which the wheels of the crane travel, and by means of which the overturning of the crane on the runway is prevented The crane is 170 feet long, from out to out of arms, 55 feet high from top of rail to underside of crane, and has a lifting capacity of 15 tons, half way out on the arms, and five tons at the extreme end of the arms.

For this crane service the Wellman-Seaver Engineering Co. furnished the American Steel Barge Co. complete detail plans and specifications, covering the construction of the runway, and the framework of the crane. It also furnished the Barge company and put in position on the crane, all the gearing and the electrical equipment throughout, the Barge company doing the work on the framework of the crane and runway in its own shops, under the direction of the contracting company.

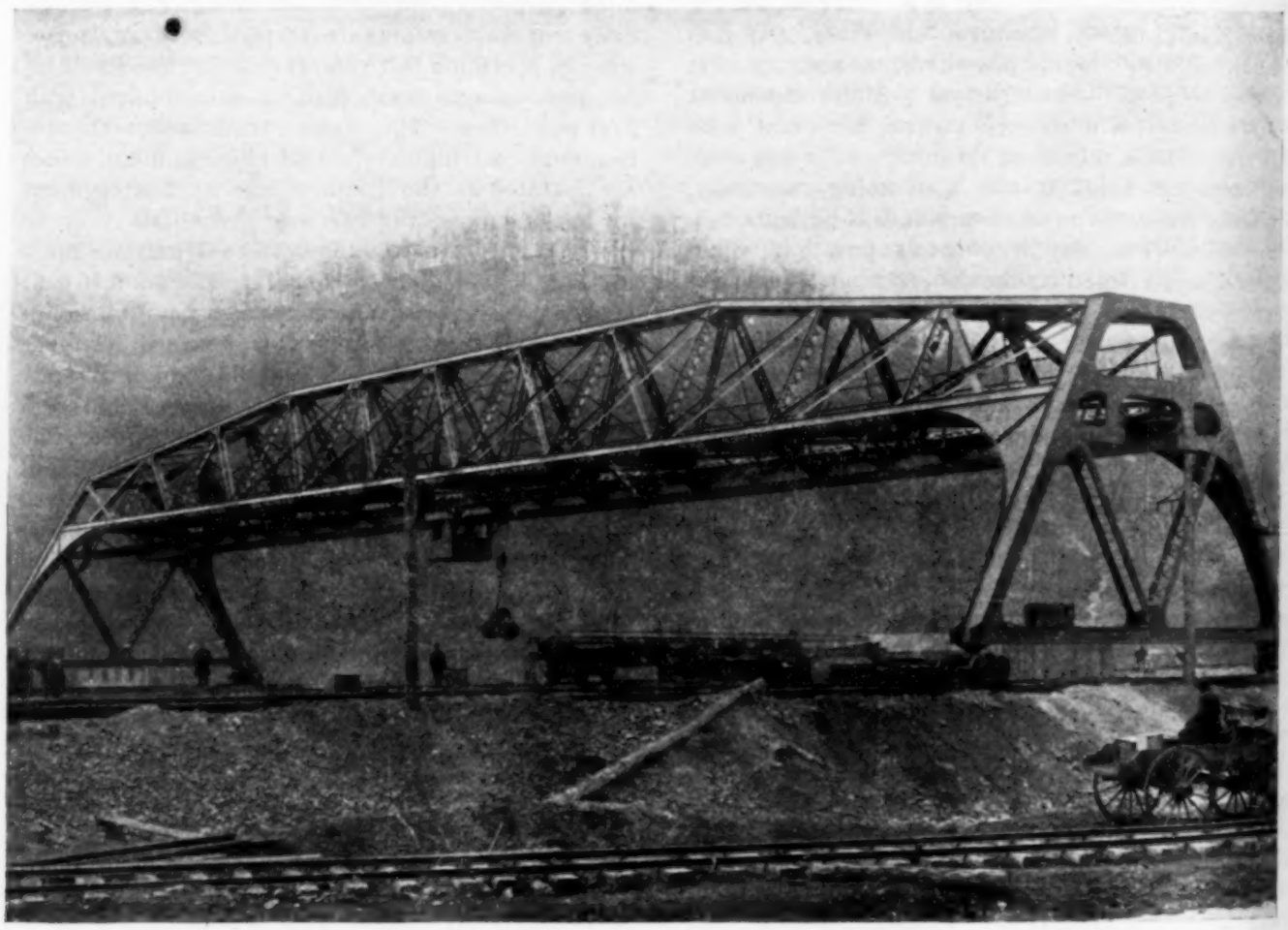


FIG. 1.—200 FT. SPAN GANTRY CRANE IN BEAM YARD OF CAMBRIA IRON CO., JOHNSTOWN, PA.

Foreign Machinery Orders Keeping Up.

Manufacturers of machine tools with foreign connections are from four to six months behind their orders, 60 per cent to 90 per cent of which come from abroad, with no signs of cessation. Meanwhile domestic business has equalled almost any mid-summer in dullness, according to the statements of dealers east and west, with few exceptions. But the general business improvement throughout the country, the gradual increase in the number of men employed in many manufacturing lines, the advance in iron and steel, the continued low rates for money, and the abundant crops of 1898, remind an observer of a mighty flood gathering force to sweep everything before it; and the question arises—what will our machine tool builders do when the domestic trade of this country attains its normal volume?—[Machinery.

In Scotch boiler engineering some remarkable advances have been made, says the *Engineer*, in reviewing the progress made in marine engineering in the year 1897. "A few weeks since Mr. Mudd did a new thing. He has made Scotch boilers ten feet long, and of large diameter, with the shell made of two plates only, flanged at the ends and riveted to the flat end plates. There are two longitudinal straps the whole length of the boiler. After these plates have been bent and flanged they are placed in a great annealing furnace to do away with local strain. There are no rivets at all under the boiler. Very heavy plant and very big plates are needed, but the boiler thus made is a magnificent piece of work."

THE IRON ORE FREIGHT RATE HEARING.

The Minnesota Railroad Commission, which was in session at St. Paul last week, hearing further testimony on the complaint made against the freight rates of Minnesota's iron ore railroads, adjourned to Cleveland on Monday, Sept 12. Sessions were held on Tuesday and Wednesday at the offices of Pickands, Mather & Co., in the Western Reserve Bldg. The three railroad commissioners of Minnesota are I. B. Mills, chairman; J. H. Baker, and Nathan Kingsbury. Among others present at the hearing were F. T. Gates, of New York; J. L. Greatsinger, president of the Duluth & Iron Range Railroad; W. J. Olcott, president of the Lake Superior Consolidated Mines; F. B. Kellogg, of Duluth, law partner of Senator C. K. Davis; G. Wellwood Murray, of New York, counsel of the Consolidated Mines; J. H. Chandler, of Chicago, counsel for the Minnesota Iron Co., and J. B. Cotton, attorney of the Consolidated Mines at Duluth. These are the attorneys for the roads: W. W. Billson, of Duluth, is the attorney of the complainants in the case. .

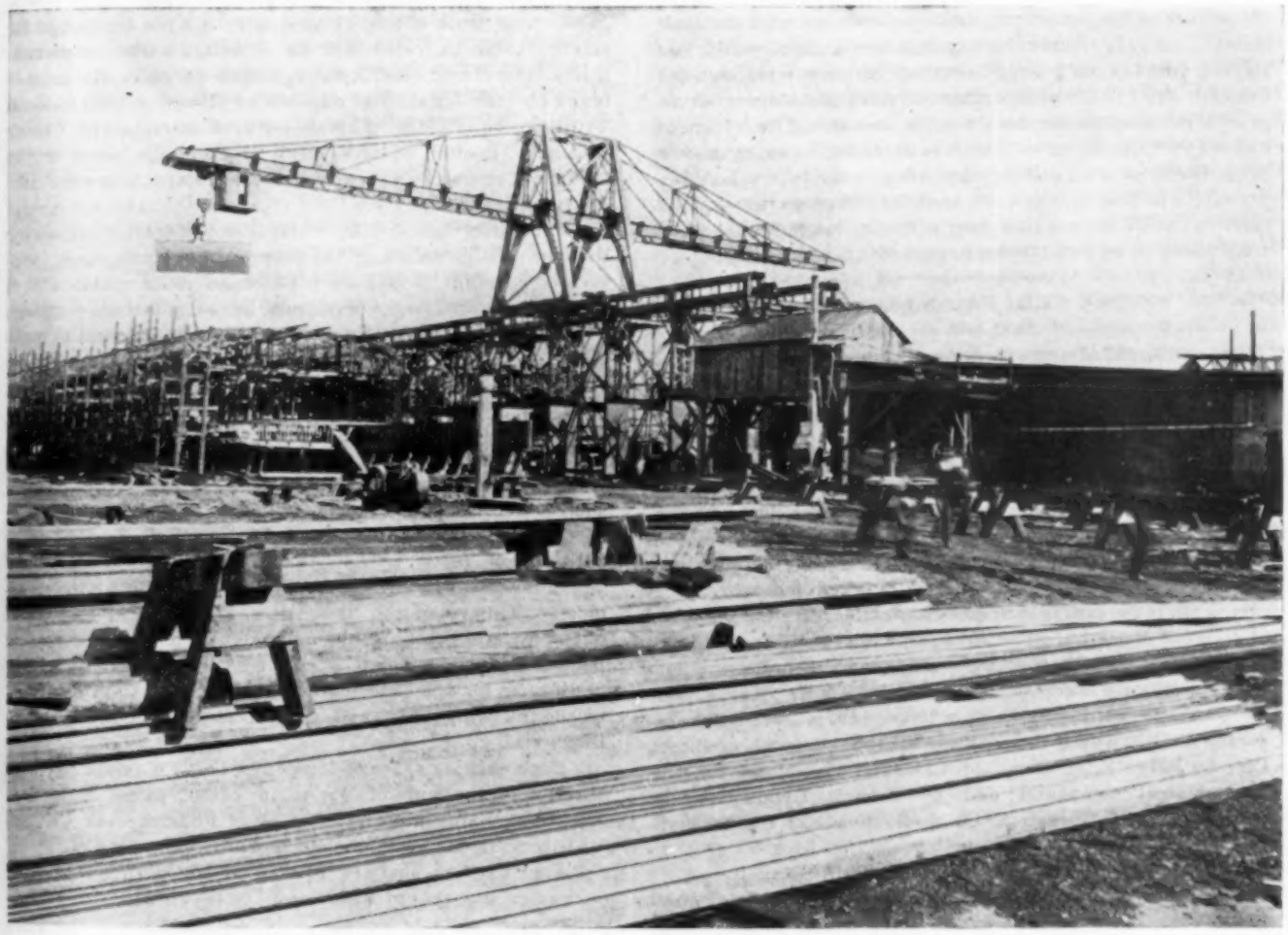


FIG. 2.—CRANE SERVICE AT YARD OF AMERICAN STEEL BARGE CO., WEST SUPERIOR, WIS.

The case was taken to Cleveland for the purpose of securing testimony by the iron ore men and sales agents to the general effect that reductions in freights by the ore roads of Minnesota would not help the independent mine owners, who are the putative complainants in the case, but would simply result in giving the furnacemen their ore at a cost less by just the reduction in rates.

The first witness was H. G. Dalton, of Pickands, Mather & Co., Cleveland. He stated that of the shipments from all Lake Superior mines about half were by concerns that smelted their own ore, and that these parties were the ones that made the prices of lake ores by the competition of their products with those of iron manufacturres who bought ore in the market. His experience led him to believe that every reduction in costs would be absorbed by the furnaceman, who would demand and would be able to get a corresponding reduction in the price he paid for ore. He also stated that a reduction in rates covering the Minnesota ranges would not stimulate the production of Mesabi ores, for the reason that as much of that ore was now used as furnacemen were able to carry in their furnace burdens, this anxiety of theirs to use a maximum amount being the result of the difference in the price of Mesabi ore as compared with old range ores, amounting in the case of ores of a similar chemical character to 70 and 75 cents a ton. The margin of profit is very close and is getting closer every year, and if the furnacemen could use more Mesabi ore at the difference he would be very glad to do so. It has been found, in practice, that no more than 33 to 40 per cent of Mesabi ore can be used in the blast furnace, owing to its physical composition, as it is likely to make trouble and cause explosions, if used in greater quantity. He considered mining and ore transportation both hazardous investments for the capital involved, by reason of the changes that come from year to year.

Attorney Billson endeavored to show that any reduction in costs of Mesabi ores would vastly extend their use by enlarging the radius of consumption. Mr. Dalton stated that the point had been reached in the development of the mining business where the miner could get no profit at all from his operations or must be content with that meager profit that the furnaceman was willing to give rather than himself hazard an investment in mines. This condition he claimed had already been reached on the Mesabi range on account of the operation there of mines by furnace interests.

Mr, Billson, by his questions in cross-examination, sought to show that an excessive profit on transportiation made by a mining company that was hauling ore, was equivalent to a rebate and that the outside shipper suffered. Later in the day he was permitted to get answers to his questions as to what witnesses thought of such a case. They considered rebates wrong, but were not willing to admit that there were rebates, in effect, in the case presented.

H. B. Shields of the Girard Furnace Co., Girard, O., the first users of Mesabi ores in quantities, testified that he had used quantities from 5 to 100 per cent of Mesabi ore in his furnace and that a number of men had been killed as a result of the excessive use of the ore. He now considered 33 per cent the most judicious percentage. He admitted that excessive

rates were discrimination, but did not know that the rates complained of were excessive.

W. G. Mather, president of the Cleveland-Cliffs Iron Co., was the next witness. He considered the investments of the Minnesota ore roads hazardous, and had disposed of the bonds of a road for ore hauling, where ores were assured for a long period and the rate of interest was 6 per cent, only to stockholders in the mines that supplied traffic to the road, and of whose business these stockholders thoroughly knew. He considered that Mesabi ores could be used to 25 to 50 per cent of the furnace mixture. He went into a consideration of rates past and present, and was of opinion that a reduction in the price of Mesabi ores, or of Vermillion ores, though the latter were only 10 per cent of the total production, would compel all other mines to reduce accordingly.

L. B. Miller, who has charge of the selling department of the firm of Oglebay, Norton & Co., said that his firm last years old nearly 3,000,000 tons of ore. He showed why the percentage of Mesabi ore in the furnace was small, and added that the great Duquesne furnaces of the Carnegie Steel Co., built to use at least 75 per cent of Mesabi ores were not able to use more than 35 per cent. He considered the use of Mesabi ore to be limited by the character of the ore, and brought out very clearly the fact that furnacemen would use all they could at the great differential in price. He did not consider any further cheapening in cost of Mesabi ore would greatly increase its use, for the same reason. The control of mines by furnacemen, he said, was an added factor in the low price for these ores, and he saw very little future for any producers in that district. He said the reduction in railroad rates in the old ranges this year and the lower vessel rates were followed by a reduction in ores of 25 cents a ton.

THE FEDERAL STEEL CO.

The certificate of incorporation of the Federal Steel Co., with a capital of $200,000,000, was filed Friday aftern on, Sept. 9, in Trenton, N. J., in the office of the Secretary of State The State franchise tax was $40,000, paid by the Corporation Trust Co., of New Jersey, and was the largest fee ever paid to the Secretary of State upon the organization of a corporation. The business of the company is to carry on mining and manufacturing of all kinds, and special attention is given to the business of transportation and to the purchasing and equipping of railroads. A marked feature of the certificate is the power to acquire and undertake the business of all other concerns. The stock, which is $200,000,000 fully paid, is one-half preferred, 6 per cent, and one-half common.

The certificate is signed by Charles C. Cluff, Charles McVeagh, and Benjamin C. Van Dyke. It is witnessed by James B. Dill, who is the counsel for the Corporation Trust Co.; by Judge E. H. Gary, of Chicago, as counsel for the various steel companies; and by Francis Lynde Stetson, counsel for J. P. Morgan & Co., who financed the transactions.

Circular to Stockholders.

The following circular to stockholders in the three companies, which are to be merged in the Federal Steel Co., issued from New York Sept. 9, and signed in each case by the directors of the company to which the stockholder receiving the circular belongs:

Dear Sir:—During the year holders of a large proportion of the shares of the Illinois Steel Co., of the Minnesota Iron Co., and of the Elgin, Joliet & Eastern Ry. Co., respectively, have been carefully considering the advisability of so uniting the properties of these companies, and if practicable, also those of the Lorain Steel Co., situated at Lorain, O.; and Johnstown, Pa., that the same may be operated more economically and with results more advantageous to all the stockholders of the several companies. Accordingly, after a very thorough investigation of the several properties and of their values, actual as well as relative, they have devised a plan for the accomplishment of the indicated objects, and have decided to take advantage of the opportunities offered by the plan, which is as follows:

"A corporation called the Federal Steel Co. has been organized under the laws of the State of New Jersey, with an authorized capital stock of $200,000,000, of which one-half is to be six per cent non-cumulative preferred stock, and one-half is to be common stock. The Federal Steel Co. is to acquire such portions, not less than two-thirds, of the capital stock of the three several companies above named as may be offered on the basis proposed. The Federal Steel Co is also authorized to acquire an interest of at least two-thirds in the manufacturing properties of the Lorain Steel Co., at Lorain, O., and Johnstown, Pa. $3,875 000 in cash is to be provided, which may be used for such acquisition, if made. It is arranged also to provide $10,000,000 cash capital for the treasury of the Federal Steel Co., and also the sums required to pay organization expenses.

"A syndicate, which includes many large stockholders, has entered into an agreement by which, among other things, it has undertaken to furnish these several sums, amounting in the aggregate to $14,075,000 in cash, to the extent that the same shall not be provided in the manner hereinafter stated by the holders of stock in the existing companies. It is expected there will be issued $52,000,000 of preferred stock and $48,000,000 of common stock for the purposes above named.

"The syndicate will cause to be offered to stockholders of each of the three companies first above named the privilege of receiving stock in the Federal Steel Co., in exchange for existing stock, provided that on or before Oct. 1, 1898, two-thirds or more of such existing stock properly endorsed in blank for transfer shall be deposited either with the Colonial Trust Co., St. Paul Bldg., New York, or with the Old Colony Trust Co., Boston. [Here terms of exchange noted in the statement below are repeated for the company to which the stockholder belongs.]

"The undersigned, after careful consideration, believing that the consummation of the plan proposed will result in increased earnings, decreased expenses, a more stable cost of manufacture and larger dividends, have decided to exchange their shares for the shares of the new company, and to make the cash payment on the stock owned by them, as required under the plan."

The Basis of Stock Exchanges.

The following circular signed by the Colonial Trust Co., of New York, and the Old Colony Trust Co., of Boston, was issued to the shareholders of the Minnesota Iron Co., the Illinois Steel Co. and the Elgin, Joliet & Eastern Railway Co., under date of Sept. 10:

"Pursuant to arrangements made by a syndicate for an exchange of shares of the above-named companies for shares of the Federal Steel Co., the undersigned give notice that in behalf of such syndicate, they are each prepared to receive certificates for any such shares for purpose of such exchange on the following basis and subject to the following conditions, viz.:

"Each existing share of Minnesota Iron Co. (upon payment thereon of the sum of $27.10 in cash), to be entitled to 1 355-1000 shares in preferred stock of Federal Steel Co., and 1 84-1000 shares in common stock of Federal Steel Co.

"Each existing share of Illinois Steel Co. (upon payment thereon of the sum of $20 in cash) to be entitled to 1 share in preferred stock of Federal Steel Co., and 8-10 of one share in common stock of Federal Steel Co.

"Each existing share of Elgin, Joliet & Eastern Railway Co. (upon payment thereon of the sum of $17.50 cash) to be entitled to ¾ of one share in preferred stock of Federal Steel Co., and 7-10 of one share in common stock.

"Shares of the Minnesota Iron Co., the Illinois Steel Co. and the Elgin, Joliet & Eastern Railway Co., to insure participation in this arrangement, must be deposited with either of the undersigned trust companies not later than Oct. 1, 1898, subject to the above mentioned cash payment in respect thereto, and such cash payment must be made to the same trust company not later than Oct. 10, 1898. Transferable receipts will be issued for deposited shares and the cash payment, when made, will be noted on such receipts.

"The consummation of the proposed arrangement is dependent upon its acceptance by holders of at least two-thirds in amount of the shares of each of the three constituent companies. If, for any reason, the arrangement shall not be carried out, the deposited shares and the cash payments will be returned upon surrender of our receipts. All shares for deposit must be assigned in blank and must have proper revenue stamps attached. The shares of the Federal Steel Co. are of the par value of $100 each. Suitable cash settlements will be made at time of delivery of the new stock in respect to fractions of shares of such stock accruing to any depositor."

Review of the Technical Press.

[Translation, Condensation and Comment expressly for The Iron Trade Review by Dr. Richard Moldenke.]

Strength Tests of Swedish Iron.—*Engineering*, Aug. 19, gives a number of tests of iron and steel taken from the publications of the Swedish "Jaernkontoret." The annual production of hammered iron is about 200,000 tons, but open-hearth steel is fast making inroads into this branch of the iron industry in Sweden. The well known tough Swedish iron is practically free from phosphorus, can be readily heated to a very high temperature without injury, and is noted rather for its softness and toughness than for its strength. Very little of the iron made in Sweden is puddled, the total annual production being only 1,800 tons. The staple article is the Lancashire hearth process iron. The strength of puddled iron plates is 38,000 to 45,000 lbs., per square inch along the fibre, and only 20,000 to 26,000 across it, while the Lancashire plates run 44,000 to 56,000 lbs. either way. Swedish steel having 1 per cent carbon seems to possess the greatest strength, and as the carbon goes up the ultimate strength and the elastic limit go downward, while the steel gains in hardness. Steel with 0.9 per cent carbon can be welded with a sand flux, 1.1 per cent with borax. Steel up to 1.3 per cent carbon can still be welded, but with difficulty, and above this not at all. In hammering steel special attention must be paid to the temperature, the higher the carbon the lower the heat. Thus .40 carbon steel can be hammered at 1,800° F., while 1,380° F. is given for 1.40 per cent carbon steel. An interesting table of the uses to which various carbon steels can be put to is given, from which the following items are selected: Steels with carbon up to .10 per cent are good for screws, cut nails, telegraph, and telephone wires. With .10 to .25 carbon, for boiler and ship plates, blacksmith's work, boiler tubes, welded axles, and wire rope. Bicycle tubing, machinery steel, and wheels, carriage axles, require .30 to .50 carbon steel. .50 to .70 is good for ropes for elevators, water hardened springs, and circular saws for hot iron; .75 to .90 for piano wire, spiral springs, wood-turning tools, and cold chisels; .95 for knives. 1. per cent carbon steels are suitable for saws, drills, cutters, 1.25 per cent for razors, lathe tools, and 1.40 per cent for scrapers for metal work.

Scaffolding in Blast Furnaces. [*Stahl und Eisen*, Aug. 15.]—Mr. K. L. Koch describes an experience in the line of scaffolding which very nearly resulted in the blowing out of a furnace, and gives some hints regarding the occurrence of such troubles and their remedy. The furnace in question was of a type in which the charges did not loosen up enough in descending. With a total height of 65 ft., 42 of which was above the bosh, the width at the top was 15 feet and only 20 at the bosh. Consequently during a run of two and a half years, this furnace exhibited a tendency to hang up continually. After a fairly good run for some time trouble began. The charges hung and then slipped periodically, and finally the escaping gases would not burn, and the furnace ceased melting. All the ordinary means to correct the evil were exhausted; as fast as the charges were brought down new scaffolds would form. By boring into the brick in various places it was found that heavy sintered masses had stuck to the sides and upon these the charges had scaffolded. Had these masses been lighter they could have been removed by partly withdrawing the tuyeres and putting a special row of them up in the bosh. In this case, however, the blast would not penetrate until there was a slip. In order to get at the facts of the case, as much of the contents of the furnace was blown out as possible, through the agency of repeated slips, success attending these efforts until only six feet remained. After turning off the blast for some time, the interior of the furnace could be viewed from the top, and it was seen that the sides were clear but that heavy masses of material had adhered to the bosh and the lower part of the shaft. These masses sloped downward and inward conically, and thus formed an excellent springing base for the arching scaffolds. An attempt to burn out these accretions by filling up the furnace with coke and some limestone failed dismally, and finally a last attempt was made before resorting to blowing out. The furnace was again emptied as much as possible, and the location of the troublesome masses fixed by means of small test holes. Four equidistant holes three feet square were cut into the furnace in a zone just below the accretions. Work was then commenced to break out the five feet thick masses with bars and scrapers, there being no formation of slag noticeable. The outlook was not encouraging, though the origin of the trouble was quickly ascertained. A regular dome had gradually formed on the bosh, leaving a hole only seven or eight feet in diameter through which the charges had to pass, these very naturally wedging themselves in, and finally slipping. By breaking away the support of this dome the weight helped to gradually loosen it up and finally the whole mass fell in. The holes cut into the furnace were closed up temporarily, and the blast put on to melt down some of the debris. After this the smaller pieces were removed and the lining left clear and in good shape. Charging began at once. The iron came out dull at first, but inside of 12 hours could be blown in the converter, and the full capacity was reached within 48 hours. The masses taken out proved to be nearly all coke with a little limestone and a dust disseminated throughout the mass such as remains on the bosh when a furnace goes out of blast. Mr. Koch now goes into a discussion of the causes of scaffolding, giving it as his experience that in general only those furnaces have to contend with this trouble which continually blow the same kind of iron, be it white or gray. By changing the burden of the furnace, in the production of different classes of pig iron, the zones of reduction and carburization are shifted, thus affording opportunity for the removal of the masses adhering to the sides of the furnace. The truth of this statement is especially noticeable in changing from ferro-manganese, where exceptional care must be exercised to avoid contamination of the iron blown by the sudden coming down of these accretions. Scaffolding is caused by poor coke, soft and wet ores, the changes produced by bad weather, in the stock going into the furnace, and too high shafts in the furnaces themselves. Masses begin to adhere to the bosh, building up more and more until a stage is reached at which the loose material above begins to remain permanently at its natural angle of repose, thus forming a funnel, the mouth of which is the opening left through the arched formation. Naturally, the succeeding charges, instead of loosening up as they descend, only pack the tighter, and the result will be continued slips and finally a catastrophe. If this process is observed to be working sideways, the best remedy is to draw back the tuyeres a little for a week or two at the spot above which the trouble is supposed to exist. The result will be found very beneficial. If the obstructions are formed all around the furnace, and the heroic remedy described above is to be avoided, Mr. Koch recommends the placing of a series of tuyeres about five or six feet above the regular ones, and introducing a strong blast. Where these troubles are of constant occurrence, provisions of this kind should be readily available at all times.

Western Foundrymen's Association—Autumn Meeting.

The annual outing meeting of the Western Foundrymen's Association will be held at Racine, Wis., Wednesday, Sept. 21, and the excursion to that city and the dinner served in the evening are tendered the association by the pig iron and foundry supply houses of Chicago and vicinity. The Goodrich Line steamer, leaving Chicago at 8:00 A. M., will take the members of the association and their friends to Racine, arriving there at 12:30 P. M. The afternoon will be spent in visiting the various foundries and manufacturing establishments in Racine, the particular point of interest being the works of the J. I. Case Threshing Machine Co., which will be open to inspection. At 7 P. M. dinner will be served to the visitors at the Racine Hotel, and the return trip to Chicago will be made on the Goodrich Line steamer, leaving Racine at 10 P. M. In order to make arrangements with the steamer and the hotel it is necessary that the secretary know in advance just how many will make the trip, and how many will attend the dinner. It is requested that all those intending to make the trip notify the secretary not later than Saturday, Sept. 17. Arrangements will only be made for those who notify him on or before that date. All Western foundrymen are cordially invited to attend, and to bring their friends who may be interested in the work of the association.

SILICON AND CUPOLA PROBLEMS.

We make the following extracts from a paper contributed to the discussion on the physics of cast iron, which was carried on through several meetings of the American Institute of Mining Engineers. It is by Bertrand S. Summers, of the Western Electric Co. Chicago:

Let us now endeavor to see what grounds there are for the assumption that silicon is the governing factor in cast iron. If we have several pieces of cast iron, made at different dates from practically the same mixture, the analyses of which show practically the same total carbon and a variation in silicon, we have an excellent opportunity to trace the effect of silicon. For example, in the following table, are irons which would seem to show this quite clearly:

TABLE I.—ANALYSESIOF CHARCOAL IRON CASTINGS.

	I.	II.	III.	IV.
Silicon	2.20	2.66	2.92	2.41
Graphitic carbon	2.92	2.93	2.77	2.98
Total carbon	3.44	3.48	3.41	3.42

The other constituents of these irons are nearly the same, and all of them are controlled as far as possible in foundry practice. They were made from almost identical mixtures, as is clearly indicated by the uniformity of total carbon. It is evident that this table does not support the unqualified assertion that an increase in silicon causes a proportional increase in graphite, and the practical rule, based on that theory, that silicon may be blindly added to the foundry mixture, without considering other conditions, in order to increase graphite and soften the iron, is not substantiated. Comparing irons II. and III., we find that although the latter contains 0.72 per cent more silicon than the former, the graphite is 0.15 per cent lower, while the total carbon is practically the same. Obviously this increase in silicon has not produced graphite, yet the total carbon indicates that there is no marked difference in burden.

Taking IV. as the second in the series, we see that silicon increases about 0.20 per cent, yet that the graphite is nearly constant, except as to III., which is both highest in silicon and lowest in graphite. The fair deduction seems to be, either that silicon has no marked effect upon graphite in ordinary foundry practice, or that there are other conditions more potent. The latter view seems the more probable.

The above analyses are taken from a vast number made in the course of practice, which confirm this conclusion. Daily records for months show conclusively that the silicon varying between two and three per cent has not nearly the effect on the graphite that it is usually supposed to produce. No relation apparently exists between the change of silicon and the content of graphite within these limits, and there is little if any doubt, if we can judge from this long series of tests, that there are other influences in cupola practice which are more potent than the variation in silicon. The above table has been selected as most clearly setting forth this view.

Another proof of this proposition is seen in the analyses of pig iron, before they are introduced into the cupola. Pig iron shows the effects of the metalloids in the blast furnace, instead of in the cupola; yet even in the blast furnace, with its high temperature, the silicon is not always able to govern the graphite. For example, the following are strong indications in this direction:

TABLE II.—ANALYSES OF PIG IRONS.

	I.	II.	III.	IV.
Silicon	7.04	7.43	3.36	3.30
Sulphur	0.04	0.029	0.051	
Phosphorus	1.39	1.05	0.606	
Graphitic carbon	2.02	1.95	3.31	3.26
Total carbon	2.24	2.19	3.33	3.37

Here it appears that the irons carrying more than seven per cent of silicon have less graphite in proportion to the total carbon than the one containing 3.36 per cent. Number III., however, is a remarkable iron, and one that is seldom seen, although its high proportion of graphite to total carbon is quite characteristic of the brand, and has been found in most shipments received from this furnace. This anomaly must therefore be due to local conditions.

The castings in Table I. were all compounded from high graphitic charcoal iron. In coke iron mixtures the failure of silicon to increase the percentage of graphite is even more marked. The following analyses are taken from casts made entirely from coke irons:

TABLE III.—ANALYSES OF COKE IRON CASTINGS.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
Silicon	2.85	3.76	2.62	2.47	3.18	3.11	2.79	2.95
Sulphur	0.073	0.083	0.074	.....	.....	.....	.....	.....
Phosphorus	0.557	0.612	0.469	.....	.....	.....	.....	.....
Manganese	0.39	0.260	0.42	.....	.....	.....	.....	.....
Graphitic carbon	3.13	3.05	3.17	2.85	2.69	2.78	2.67	2.61
Combined carbon	0.18	0.24	0.08	0.74	0.51	0.62	0.54	0.60
Total carbon	3.31	3.29	3.25	3.29	3.20	3.30	3.21	3.21

The first four members of this table have about the same total carbon, and were made from the same irons, but with minor changes in the burdening. It is really discernible from these irons that little if any relationship can be traced between the silicon and the graphitic carbon. Looking at the last four members, the total carbon contents are seen to be practical identical, while the graphitic carbon is very nearly the same in the irons containing the highest and the lowest content of silicon; and, again, no relation can be traced between silicon and graphitic carbon. As in the case of the first four, these mixtures were comp unded from the same irons with but minor changes in the burdening.

That temperature controls the effect of silicon is shown when a close examination is made of different shipments of the same brand of pig iron, the blast furnace running on the same mixture. A case came under my personal observation recently, in which the graphitic carbon ran from 3.40 to 3.50 per cent, the silicon remaining in the neighborhood of 1.5 per cent; but when the silicon rose to 1.8 or 2 per cent, the graphitic carbon rose above 3.50 per cent. In nearly every case of this kind a decrease in the total carbon was likewise noticed. This has also been frequently noticed with other brands of iron, and it is more apparent with charcoal irons than with coke. The heat in the blast furnace seems to be great enough to make the silion a more important factor.

It is hardly legitimate to attribute these differences to the effect of other elements, as a glance at the tables will show that they do not vary enough to enter into the consideration. It would seem, on careful consideration, that the effect of silicon is largely governed by the temperature at which it is allowed to act. It is doubtful if the necessary temperature is obtained in the cupola to permit the silicon to have a very strong effect upon the carbon, where its content does not vary beyond certain limits. It also seems probable that, where the burden is light, the effect is not as marked as in the case of light burdens, where more heat is developed.

Melting Ratios.

It is common to hear among foundrymen that this or that one uses certain fuel ratios, but is seldom stated under what conditions the melt is made. One foundryman is melting iron with a ratio of one to thirteen, while his neighbor is running on a ratio of one to seven. This means almost nothing unless the amount of iron melted and the condition of the material introduced into the cupola are taken into consideration. It need scarcely be said that the foundryman who melts 60 tons per day can make a better showing in relation to fuel consumption than one who melts five tons and has the same iron poured from his cupola. The foundryman having a smaller burden uses more coke on his bed in proportion to the iron melted. It is also evident that, where it is desired to melt large pigs and large-sized scrap, a great coke consumption is necessary, to tap the same iron from the cupola. Barring these two conditions which are evident to every one, the iron is, within certain limits, softer when more coke is used. If analysis is made of metals cast with different coke consumption and practically the same burden, as a general rule, the one melted with the higher coke consumption, up to a certain limit, will contain the most graphite. This is only true when the cupola is run on a coke consumption below what is really necessary to pour iron of a high temperature, and this, again, is largely dependent upon the blast; but where little attention is devoted to the blast, and especially where the blast pressure is below what it really should be, an increased coke burden will often have a beneficial effect upon irons, if too much is not added. If a foundryman is using his blast judiciously, and the coke ratio is figured for the best economy, little can be gained from an increased coke consumption.

Influence of Oxidized Material.

Little attention has been paid to the peculiar effect of introducing rusty material into the cupola. Only one experience of this kind is necessary to convince a foundryman of the

deleterious effect of corroded scrap. The surface rust on pig iron is usually not noticeable, but where corrosion has taken place to any considerable depth, a very bad effect is quickly discovered. This is particularly true where light scrap is used, and a large surface has been exposed to the corrosive effect of the atmosphere, in proportion to the small volume. A prominent effect in bad cases of this kind is to make the iron exceedingly dirty and spongy, and when this dirt is noticeable, the cleaner the material introduced into the cupola, the cleaner will be the casting obtained. The writer was confronted some time ago with a serious complaint of dirt in the iron and on investigating the case, found it due entirely to light scrap which had been seriously corroded. Upon the dropping of this scrap from the mixture the trouble entirely disappeared. There is very little doubt that in many cases, spongy iron poured from the cupola is traceable to the use of corroded material Besides this inconvenience, material of this nature tends to harden the iron to a limited extent. But this is not nearly as noticeable as the former effect, and cannot be detected in iron high in graphitic carbon.

Effect of the Blast.

There is scarcely any one factor in cupola practice deserving of more close and constant attention than the blast. There are reasons to believe it exerts considerable influence in furthering the mutual reactions of the different elements in the metal, but this has not been clearly demonstrated in the tests thus far made. Aside from its effect in this way increase of blast seems to have a decided tendency to increase the total carbon in the cast iron, and correspondingly to increase the percentage of graphite. As demonstration of this, the composition of the irons in the following table, which were made from the same mixture at different dates, may be interesting:

TABLE IV.—ANALYSES OF CASTINGS FROM THE SAME MIXTURE.

	I.	II.	III.	IV.	V.	VI.	VII
Silicon	2.30	2.74	2.03	2 27	2.04	2.10	2 21
Graphitic carbon	2.98	2.59	2.98	3.07	2 90	3.11	3.06
Total carbon	3.44	3 15	3.07	3.52	3.61	3 74	3.63
Lbs. of iron per lb. of coke	6.4	5.4	6.2	6.3	7.6	7.6	7.0

The first three members of this series were cast from a larger cupola than the remaining members. Only the third iron shows a high carbon content that compares with the last three. The blast apparently varies. Iron is sometimes poured, which can only be accounted for in this way. If II. is contrasted with I. and III., a decided difference is noticed; also III. differs considerably from I. and II. These irons are all made from practically the same mixture, and are here mentioned to show the anomalies that are so common in foundry practice Unfortunately, reliable measurements have not been secured on blast pressure, but, inasmuch as the air is supplied by an open blower, the amount of air passed through the cupola would be largely dependent upon the resistance found in the cupola itself. The true criterion of the effect of the blast is the amount of air passed through the cupola at a given time, and not the blast pressure. Whenever an attempt was made to measure the blast pressure, it was always found to be practically the same, even when both cupolas were run at once. The explanation of this is obvious. Inasmuch as the fan is not entirely enclosed, the pressure can never exceed a certain maximum, or air will be forced back through the fan. In the case here cited, the fan was somewhat overworked, and probably air was being forced back through it. It would thus happen that, if the burden offered more resistance at one time than at another, less air would pass through the cupola at that time. This would seem to be the explanation of the difference in these three irons made from the same cupola.

This hypothesis is apparently verified when the remaining four members of this series are considered. These four irons are compounded from the same pig irons as the first three, as are also all the irons in Table I. The mixture has been varied but slightly, and if any difference could be expected from this cause, the irons in Table I. would show higher carbon contents than those of Table IV. The last four irons of Table IV. were melted in the same cupola as those of Table I., but more air was passed through the cupola in the former case. Also more air was passed through the cupola in melting the last three members of Table IV. than in melting No. IV. of this table. This was accomplished by using more tuyere openings. In the case of iron IV., two openings in the upper set of tuyeres were used, besides the full lower set. With the last three irons of this series the full upper, with the full lower set, was used. With the irons of Table I. only the lower set was used. Contrasting iron IV. with those of Table I., a higher content of total carbon is noticed, and also a corresponding rise in the graphitic carbon. Again, comparing members V., VI., and VII., with IV., the same thing is noticed. This is particularly noticeable in VI., and is probably due to the causes mentioned above. These tables do not appear to demonstrate that silicon has had any greater effect in promoting graphite under the effect of the increased blast. It may be that if the blast pressure were increased to a still greater extent, the effect would be noticeable. It would seem also a demonstrated fact that the temperature is the governing effect of silicon, and the temperature of the cupola is certainly increased by increased blast, if a certain maximum be not exceeded. This limit is seldom reached in foundry practice, and faulty iron is more frequently due to a scarcity of air than to an excess. The blast is probably one of the most important factors in foundry practice, and many of the mysteries not yet explained may be traced to its door. There is scarcely any doubt that it has a marked effect upon the content of total carbon, and it is not unlikely that when the results of further investigation are known, the amount of air passed through the cupola will be found to condition, to a certain extent, the effect of the metalloids in the iron.

Iron Mixtures and Iron Specifications.

An attempt has been made in the foregoing pages to demonstrate that the desire for silicon has been carried to an extreme. This desire has become a mania in some quarters. If the foregoing tables prove anything, they certainly prove that high silicon irons are, in many cases, a useless luxury. A certain amount of silicon is undoubtedly necessary, but the plan of gauging the value of irons by their content of silicon is but one step in advance of the old fracture method. The carbon is undoubtedly the governing factor in irons, and the most radical advocate of silicon can do nothing with foundry mixtures without a certain carbon content. It seems, then, that total carbon is one of the most impotrant elements to specify in purchasing foundry irons. The writer has yet to meet with an iron too high in carbon to be of excellent use in the foundry. It has been the custom in our practice to specify 3.75 per cent of total carbon in our No. 1 iron, especially when charcoal irons are purchased, while a very lenient specification is allowed in silicon, it being, for charcoal iron, not below 1.50 per cent. The furnaceman is allowed to have silicon about anywhere he wants it as long as he can furnish iron with the necessary carbon. A minimum graphite specification is also inserted in nearly every case. The philosophy of this is obvious from the foregoing pages. In the cupola comparatively little combined carbon is changed to graphite, and this is especially true when the heats are small, and, consequently, the heat developed is not sufficient to produce any marked change in this direction. This fact can easily be demonstrated in practical work, where frequent analyses are made of daily casts, and the compositions of the irons composing the mixtures are known.

In these specifications the minimum is specified, and any variation must be above this limit. This is thoroughly practical, and has been in operation long enough commercially to demonstrate its value. It is difficult to get iron merchants to make carbon determinations, but they will agree to furnish iron under specifications requiring certain minimum limits of total carbon and graphite. Whether the latter is specified or not, there can be no doubt about the necessity of specifying total carbon. Very little attention is paid to silicon in the work, as most of the high carbon irons will carry sufficient silicon for most classes of work. However, it is often useful to require a certain silicon content in the iron, so as to get sufficient graphite, as the heat of the blast furnace is sufficient to enable the silicon to control the graphite to a great extent. In the best snap-flask work, where a large proportion of charcoal iron is used in the mixture, two per cent of silicon is found to make elegant castings, and in such mixtures no ferro silicons are used; but a high silicon coke iron, carrying over three per cent of silicon and about the same of graphitic

carbon, is used. This gives good results, especially where a high grade of machinery castings and fine snap-flask work are poured from the same mixture. This is further substantiated by analyzing some of the best castings of tools and machines that can be found on the market. Some of the best known firms making this class of work will be found to be using this variety of iron. With coke iron it is well to run the silicon a little higher, although for machinery work it is best not to have it too high.

When trouble is experienced with open or spongy iron, and the trouble cannot be traced to some such cause as rusty scrap, a good procedure is to run the total carbon in the casting as high as possible. This will give a higher content of combined carbon, and at the same time the high content of total carbon, with the graphite, usually increased slightly in this way, will keep the iron soft. When this is done it is well to consider the content of silicon, and if this is much over two per cent a decrease will be found beneficial.

The Use of Carbon.

Silicon is commonly believed to enable a mixture to carry more scrap. This belief is open to serious doubt. It is obvious that if a mixture is running low in carbon, and ferro-silicon is added in greater amounts to enable the mixture to carry more scrap, this procedure will not only fail to enrich the carbon content, but will actually impoverish it. The reason for this lies in the fact that high silicon iron carries less graphitic and total carbon than a good scrap, and much less than a good cast iron. For this reason it is evident that when ferro-silicon is added to the burden, it is certain to lower the content of carbon in the cast iron somewhat. Inasmuch as the iron is dependent upon carbon for its softness, it is open to grave doubt whether, by increasing the silicon and thereby decreasing the carbon, by adding ferro-silicon, any more scrap can be carried, and the same quality of iron poured from the cupola. The amount of scrap that can be loaded into the cupola without changing the quality of the iron is dependent upon the carbon, and especially upon the graphite. Even if we admit that an increase of silicon can cause an increase of graphite, yet, if there is not sufficient carbon present to be changed into graphite, the graphitic carbon cannot be obtained in the required proportion. Further, when it is doubtful that silicon will cause any appreciable increment in the graphite, it is open to question if the ferro silicon does not tend to lower the scrap carrying ability of the mixture

A high carbon mixture averaging, for example, 3 to per cent graphite, and about two per cent silicon, will carry considerably more scrap than a mixture containing over three per cent silicon, and lower in graphitic carbon, or than a mixture impoverished in total carbon, no matter what the silicon content. This assertion can be proved in practical work, and it would seem that the popular idea to the contrary is based on a fallacy.

The carbon determinations in the foregoing tables were all made by the oxygen combustion method, and the greatest care was exercised to secure accuracy. The determinations have been checked, and the results from the furnaces used, checked with results from other laboratories. In this connection thanks are due to Mr. E. J. Ericson, whose excellent work in this particular has greatly aided this investigation.

American steel for Belfast ship yards is an import that is causing concern among Scottish steel makers, says the *Engineer*. The firm of Harland & Wolff, of Belfast, is credited with a consignment of 800 tons of large ste l ship plates from Pittsburg. These plates are 28x5 ft. and weigh two tons each, and are supposed to be landed at Belfast from $2.40 to $2.88 per ton less than if bought from Scotch or British makers. This Belfast firm consumes in shipbuilding about 40,000 tons of steel and 8,500 tons of iron per year, besides using in this time about 60,000 tons of other materials. The existence of a fine line of steamers running between Belfast and the United States and the advantages of the rapid delivery of large quantities of steel at low prices, are supposed to account for the demand upon American steel manufacturers. In years past almost the whole of the steel used in the Belfast yards came from the west of Scotland; increased consumption calls for additional supplies from the east coast, Wales, Barrow and America.

PUBLICATIONS RECEIVED.

The Heat Efficiency of Steam Boilers, Land, Marine and Locomotive. By Bryan Donkin, M. Inst C. E. Published simultaneously in London and Philadelphia, by Charles Griffin & Co., Ltd., of the former place and J. B. Lippincott Co., in the latter.

In his preface, Mr. Donkin says that he has endeavored to confine himself absolutely to the questions of tests, combustion, etc., and a careful perusal of the book shows that the author has succeeded most admirably. After having devoted 25 years to the practice of testing boilers, possibly with no thought of subsequently publishing a book setting forth the results of this long series of labors, Mr. Donkin has compiled a long list of tests, not only those made by himself, but many made by other distinguished engineers, embracing every type of boiler known in engineering practice. He also gives a description of some of the devices experimented with. While it is true that Mr. Donkin does not advance new theories or dilate upon old ones, and while his book cannot be considered a scientific work, at the same time it will find its way into the engineer's library for the information it contains, and the manner in which this is compiled, making the information ready and accessible; and it is destined to become a popular book of reference. It is a frequent complaint of mechanical engineers that they are unable at times to find the value, for evaporation purposes, of certain grades of coals, for in ordinary practice it is almost impossible, without considerable trouble, to arrive at a correct conclusion, owing to the impossibility of obtaining the necessary data. The book before us will be found doubly interesting to all who wish to solve, in a general way, just such a problem, for the reader can readily turn to the test sheets and find the information he desires. We bespeak for the work a prominent position in the class to which it belongs.

The Interest of America in Sea Power, Present and Future. By Capt. A. T. Mahan, U. S. N. 12 mo. 314 pp. Boston: Little, Brown & Co.

Capt. Mahan's books on the "influence of sea power" are accepted as in a special sense authoritative. This third one in which that phrase forms part of the title commends itself to the thoughtful reading of men of affairs at this juncture, when so many of the considerations it puts forth are under serious discussion. Some features of the policy which Capt. Mahan has consistently advocated for the United States for several years seem fairly prophetic when viewed in the light of the developments of the past four months. The strategic importance of the Nicaraguan canal, of the islands of the Caribbean, and of the annexation of Hawaii have been made clear as daylight by our war with Spain. But Capt. Mahan anticipated history by eight years in respect to the Caribbean as a great seat of naval strategy, and five years ago in a paper which forms part of the present work, he took a position in respect to the Isthmian canal and Hawaii that from being vigorously assailed is now well-nigh generally accepted. The chapter on "Preparedness for Naval War" has been given a mighty endorsement by our brief but glorious campaigns in Philippine and Cuban waters and that on a "Twentieth Century Outlook," though written more than a year ago, is in its trend, and at times in very phrase, the utterances with which reviews, magazines and newspapers have teemed, since the signal victories of the past few months. Similarly Capt. Mahan has anticipated many writers and public speakers on the cordiality that should mark the relations of the two great Anglo-Saxon powers in the years just ahead. So much that was written as prophecy or as argument for a broad policy that breaks away from the contracted notion of our National destiny we have been wont to cherish, is now either history, or a corollary of the history so newly made. It is a book of absorbing interest to every student of the history of our own times and of the problems that so soon must be solved.

The Stowe-Fuller Co., of Cleveland, has just received an order for Mt. Savage brick to be used for the Dixon garbage crematory to be put in by the Government at Santiago de Cuba, and is probably one of the first orders for material from the United States to go to that city, under the new regime. The Dixon company uses nothing but Mt. Savage brick in its high heat and special work. The brick are to be shipped to the United States Government at Santiago, from the plant of the Union Mining Co., at Mt. Savage, Md.

THE PIECE WORK PROBLEM.

There is nothing more difficult about the administration of a shop plant than piece work. Those who have settled upon a satisfactory plan find that very soon new conditions arise which make it necessary to change the prices, no matter how well adjusted they may have been originally. The greatest trouble, however, is found at the outset in fixing the rates for the first piece work schedule, and this is the key to the whole subject. We are told that the method adopted in the Rugby Works of Messrs. Willans & Robinson was to establish prices slightly higher than those for day work, and to divide the difference between the piece work and the day-work wages evenly between the works and the men. By this system the men have every inducement to earn all they can, and the benefit to the works is direct, and is clearly understood by the men.—[American Engineer.

The recent strikes against piecework at the works of R. Hoe & Co., and the Bullock Electric Mfg. Co., call attention again to the piecework system as a mischief maker and a discord breeder. We believe it to be almost impossible to find a shop in which this system has been long employed in which there is not a state of ill-concealed antagonism between the workmen and the management, growing out of the repeated cuts which the management is compelled to make in order to reduce costs, but which the men rightly understand as setting a limit to their earnings and as a punishment for extra effort.

In the past there was an ample excuse for the manager who adopted the system—the excuse of necessity; but at the present day that excuse no longer holds. The premium plan has now been before the public for several years and has been given sufficient trial to demonstrate that it not only avoids the ill-feeling which piecework foments, but that it does silently what piecework does only through constant turmoil—introduces a progressive reduction of cost, and, moreover, while with piecework such reduction is only accomplished through the antagonism of the men, under the premium plan it is the direct result of their efforts to benefit themselves.

As originally published, the plan was looked upon, and perhaps justly, as a mere scheme, without experience to prove the soundness of the claims made for it, but that view is no longer tenable. Practical use by hard-headed disinterested men has shown the system to do what it is claimed to do, and the superintendent who is not aware that the way is now open to all that he has tried to accomplish through piecework, and to relief from all its troubles, is not posted as he should be.—[American Machinist.

A 10,000 H. P. Long Distance Transmission Plant.

A contract involving 10,000 h. p. has just been taken by the Westinghouse Electric & Mfg. Co. The agreement is to transmit this enormous amount of power over a distance of 45 miles. The contract stipulates that the losses in generators, transformers and line shall remain normal, notwithstanding the difficulties involved. The plant is for the Snoqualmie Falls Electric Power Co., of Snoqualmie Falls, Washington. The power station is to be located at Snoqualmie Falls, 45 miles from Tacoma, and 31 miles from Seattle, to which places the current is to be transmitted and then utilized by Westinghouse motors.

The contract involves the building and delivery at the above points, of four three-phase, rotary armature, generators, having a normal aggregate capacity of 6,000 kilowatts, and which are to be direct connected to water wheels; two 75 kilowatt kodak exciter dynamos also to be direct connected to water wheels; high and low potential switchboards, for main power station and sub-stations at Seattle and Tacoma, involving 76 marble panels with all necessary instruments, switches, etc.; high tension oil insulated static transformers having an aggregate capacity of 10,875 kilowatts; rotary transformers with a total output of 2,700 kilowatts and six type "C" motors developing 1,600 h. p., with adequate lightning protection at both ends of the line. These machines when installed will make available for industrial, railway and lighting purposes the power of Snoqualmie Falls. The line potential will be 25,000 volts, and its current will be carried over bare aluminum wires to sub-stations where lowering transformers will sufficiently reduce the voltage for safe transmission within the corporate limits of the two cities.

This is the first large transmission to use aluminum wire. Contracts have been made for the supply—150,000 pounds—at prices that make it cheaper than copper for the purpose. The metal used will be nearly pure, being guaranteed to contain 99.30 per cent of aluminum and not more than 0.25 per cent of iron and 0.30 per cent of silica. It will be alloyed with 1.50 per cent of pure copper. While aluminum has been talked of for some time for this purpose, price or some other factor seems to have stood in the way of its practical use to any extent over long distances.

INDUSTRIAL NOTES.

The Schoenberger Steel Co., of Pittsburg, has purchased from the E. P. Allis Co., Milwaukee, Wis., a vertical cross-compound mill engine, having one 42-inch diameter high and one 84-inch diameter low pressure steam cylinder, each 60-inch stroke. It has also purchased from the Allis company a horizontal tandem compound engine, with one 32-inch diameter high and one 64-inch diameter low pressure steam cylinder, each 60-inch stroke.

At Milwaukee, $4,500 has been expended for a machine shop for the manual training department of the high school.

The entire Hammond, Ill., sheet mill plant will be in operation this month. Two mills are now running. The purchasers from the Corning Steel Co., are R. G. Sykes, and A. J. Leitch, of Niles, C. O. Hart and F. DeConigh, of the Sykes Steel Roofing Co., of Chicago, and F. R. Harris, of Los Angeles, Cal. Mr. Harris will be manager.

The American Turret Lathe Works, of Cincinnati, is the name of a new company organized to manufacture turret lathes and other machine tools. The capital stock is $50,000. The incorporators are Adolph Pluemer, Charles F. Dolle, Louis J. Dolle, John W. Pluemer, John W. Sullivan, and C. M. Conradson. M. Conradson, who has been connected with the Gisholt Machine Co., has brought out a new lathe of the type which he has developed in the past several years. It will be manufactured in four sizes. A good foreign demand is anticipated. The chief office will be in Cincinnati, with selling offices in Chambersbury, Pa. The Cincinnati office will be at rooms 39-42 Bodman Bldg., 621 Main st.

Joanna Furnace, charcoal, at Joanna, Berks Co., Pa., was put in blast this week.

The nail works, plate mill, machine shops and blacksmith shops of the E. & G. Brooke Iron Co., resumed this week, after being idle since June 11. They employ 350 men.

It is stated that the switch works of the Johnson Switch Co., at Johnstown, Pa., which have been running irregularly for some time, have secured a very large contract which will keep the plant busy for some time.

Earl C. Bacon, consulting engineer, Havemeyer Bldg., New York, has received among a large number of orders the following: 100-h. p. winding engine for a coal mine in Japan; gravity incline tramway of 2,000 ft. for British Columbia; two carloads of crushers and engines for Siberia. He has also received the contract for a complete quarrying and crushing plant and a gravity incline, to be erected near Nyack, N. Y., and is about completing a design for a mining and milling plant to go to New Zealand.

The Excelsior Foundry Co., Belleville, Ill., has just begun operations in its new plant in Oakland Addition.

Williams, White & Co., Moline, Ill., are moving into a large new foundry.

The U. Baird Machinery Co., Pittsburg, has for sale the entire machine equipment of the Duquesne Mfg. Co., of Pittsburg, makers of Duquesne bicycles, who have gone out of business. This equipment is practically new, consists of modern tools, and will be sold at reasonable prices.

The old plant of the Greensburg Nut & Bolt Co., at Greensburg, Pa., which has been idle for some time, will be started up by John Robenstein, who formerly operated the Keystone Rolling Mills, in Pittsburg, in the manufacture of skelp iron.

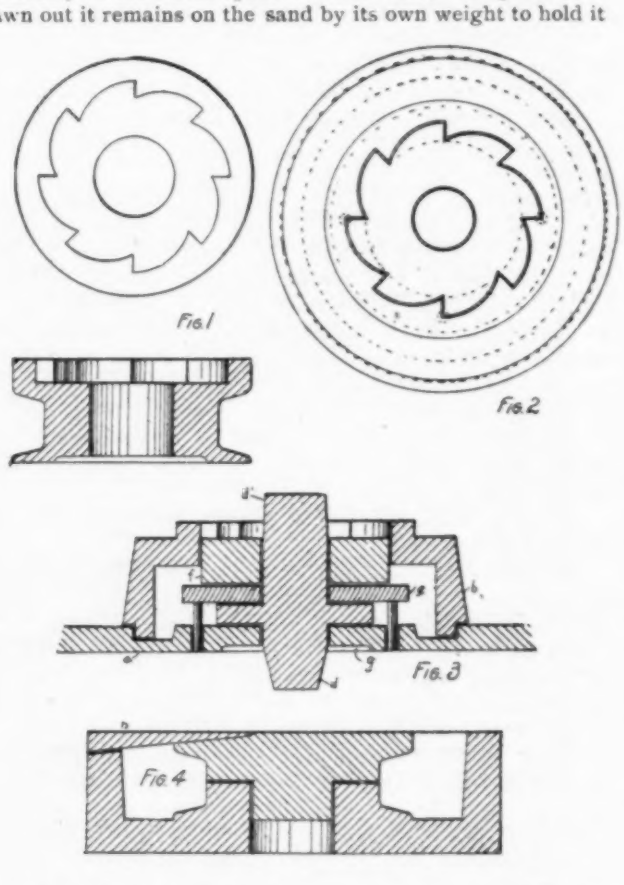
The Oil Well Supply Co., of Pittsburg, put its puddling department and skelp mills on double turn, last week, and started one of the pipe furnaces. Other departments will be put on, until a force of 600 is employed in addition to that working in the summer months.

PLATE MOLDING.

BY EZRA ESTEP.

Economy in the foundry consists in having the best possible appliances for the molder to do a good job with the least amount of hand work. I have seen from 10 to 25 per cent saved in the cost of molding by convenient arrangements of patterns on plates.

I submit two ways of accomplishing plate work which have both proved successful in practical foundries, and also a plan for making core boxes for the cores used in such work. The making of the various parts can be done entirely on a lathe and a planer, so that the expense need not be heavy. Fig. 1 gives the plan and section views of a small double flange clutch which is a difficult piece to mold successfully in the ordinary manner. It can be very easily and economically molded, however, with the proper plate and core devices, the design and construction of which are illustrated in Figs. 2, 3 and 4. Fig. 2 is a plan and Fig. 3 a section of one of six patterns arranged on the plate which is designated a. The part marked b is print, and one portion of one flange of the pattern; d is the print for the center core; and e is the stop for the follower f, which fits loosely in the clutch space so that when the pattern is drawn out it remains on the sand by its own weight to hold it



down until the pattern is entirely out of the mold. This feature can be applied to a great variety of pieces which are to be molded on plates. The cope side of the plate is counterbored, as shown at g, thus forming the countersink desired on the reverse side of the clutch being molded. The making of the core box is illustrated in Fig. 4, and needs no explanation except that the pouring runner through the core is made by the loose piece h.

A plain single flange sheave is shown in Fig. 5, and Fig. 6 shows a section of the molding plate j with the pattern k in place. The dry sand core i, is set in the pattern and the mold is ready for ramming up. Fig. 7 shows the core box for making the core i, the main feature of this being the manner of drawing the hub piece from the core before removing the latter from the box. The box itself acts as a stripping plate. —[Modern Machinery.

INDICATIONS are plentiful enough of the larger demand for labor than existed one year ago. A single example is the statement of the employment department of the Y. M. C. A. of Cleveland, that there were calls upon it for the services of 232 men and boys in August or nearly three times as many as were received in August of last year.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

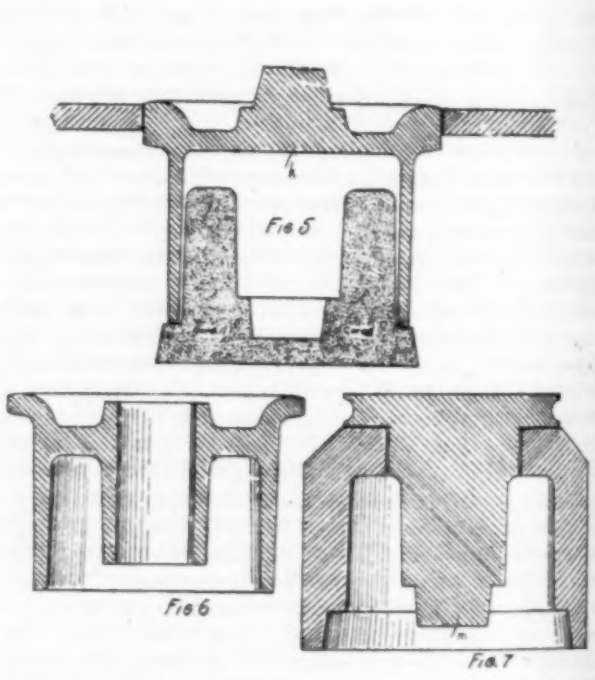
Henry & Allen Co., of Auburn, N. Y., has been incorporated for $25,000 to manufacture cutting machinery for agricultural implements. W. J. Henry, 223 State st., Auburn, is a director.

The National Motor Carriage Co. was incorporated at Trenton, N. J., for $500,000 by A. S. Winslow, T. D. Merrigan, of New York, and C. W. Parker, of Jersey City.

E. Warne, of Rutherfordton, N. C., is in the market for two steam pumps one-half inch to two inches discharge pipes, second hand, and for shafting and pulleys.

John A. Rogers, Hartselle, Ala., will buy a new or second hand gas or gasoline engine, two or three h. p.

The Monessen Steel Co., of Monessen, Westmoreland Co., Pa., has been granted a charter of incorporation, with a capital stock of $500. Among those interested are Veryl Preston, formerly of Buhl Steel Co., Sharon, Pa.; Col. J. M. Schoonmaker, and H. Sellers McKee, both of Pittsburg. It is proposed to erect a plant at Monssen for the manufacture of hoops and cotton ties.



The Globe Steel Range Co., of Kokomo, Ind., has been incorporated with $6,000 capital.

New Construction:—

The Fanner Mfg. Co., of Cleveland, is having plans made by J. N. Richardson, architect, for a new factory to be built this fall, which is to be a two story brick and iron structure, located adjoining Brookside Park, on the C., L. & W. R. R. It is to be a V-shaped building, 275x100 ft., in one wing and 250x100 ft. in the other. The foundry will not be built until next spring. It will be about 175x75 ft. The Fanner Mfg. is a corporation with $100,000 capital, officered as follows: Wm. Grief, president; L. M. Grief, vice-president; J. H. Kirkwood, secretary and treasurer; and George J. Fanner, manager of the works. It manufactures chaplets of all kinds, stove rods, bolts, and all kinds of stove trimmings, including all the nickel work about a stove, as well as hardware specialties and advertising novelties.

The Johnston & Jennings Co., of Cleveland, is about to erect a two-story building 134x64 feet. The company is also making some additions to its foundry, installing additional boiler capacity, etc.

The Racine Malleable & Wrought Iron Works, of Racine,

Wis., whose plant burned a short time ago, will rebuild a Racine Junction instead of on the old site.

Beaman & Smith, of Providence, R. I., are erecting a new machine shop 60 ft. wide and 130 ft. long, with lean-to addition 20 ft., by 50 ft. It will have a maximum amount of light consistent with good construction, will be practically fire proof, and will be arranged with traveling cranes, trolleys, and such appliances for easy handling of materials and machines. A portion of the building will be two stories, arranged for suitable offices, draughting rooms, store rooms, etc. The entire framework of the building is steel built in brick work entirely supported by the structural framwork of the building. An electric traveling crane, having a capacity of 15 tons and a span of 40 ft., will run the whole length of the main building. The sash in the sides of the building and in the sides of the monitors are arranged so that they can be readily opened for ventilation. The framework of the building is arranged with a view of easy attachment of shafting and counter-shafting for the transmission of power. The entire building was designed by and the steel work is being furnished and erected by the Berlin Iron Bridge Co., of East Berlin, Conn.

At Milwaukee, Stahl & Peak have been awarded the contract by the Stowell Mfg. Co., for the erection of a malleable iron foundry at its works in South Milwaukee.

The Brainard Milling Machine Co., Hyde Park, Mass., is erecting a new building with all modern improvements. It is 90x120 feet, basement under the whole building and galleries. The company will use the new structure for the manufacture of milling machines and gear cutters and it will replace the plant burned July 24 A storehouse on the opposite side of the street will be used temporarily for offices while the new works are being built.

The Columbus Brass Co., Columbus, O., is about to erect a building, of wood and corrugated iron, 68x48 feet.

Plans for the new plant of the Lodge & Shipley Machine Tool Co., Cincinnati, call for a building 303x90 feet, of one story, two in the back portion. The equipment includes one 125 h. p. boiler, one pump, one 100-h. p. engine.

The Lunkenheimer Co.'s proposed new plant, at Cincinnati, will be 196x300 feet, six stories.

The Shiffler Bridge Co., of Pittsburg, has received the following construction contracts: Extension to annealing house, for the Apollo Iron & Steel Co., Vandergrift, Pa., 100x107 feet; new plant of the Monessen Steel Co., at Monessen, Pa., consisting of a sheet mill, producer house and boiler house, the sheet mill building to be about 120x340 feet; crusher building for the New Jersey Zinc Co., at Franklin Furnace, N. J., requiring about 300 tons of structural material.

Buildings are being cleared from a Pullman Co. tract of land at 115th st. and the Illinois Central tracks at Chicago. It is said the site will be occupied by the plant of the new Titan Steel Co.

F. Beck is building a machine shop 26x50 on Michigan ave., Detroit.

George C. Dietrich has been awarded the contract for the erection of the large ordnance machine shop No 2 for the Midvale Steel Co., Nicetown, Pa. The building is to be of brick and steel construction, one story, with peaked roof 80 feet high, and will be 120x46 feet. The contract price is $69,000.

The plans for the new plant of the Janney Mfg. Co., Ottumwa, Ia., have been completed, and construction will commence at once. The plant will consist of a machine shop 50x100 feet; blacksmith shop, 50x100 feet; power-house, 50x60 feet; foundry, 75x150 feet, and main building, 50x150 feet.

The Atlantic Coast Line will, it is reported, soon begin the construction of a new machine shop, at Florence, N. C. H. Walters is president, Wilmington, N. C.

Additions, Enlargements, Removals, Etc.:—

Increasing trade has led the Ohio Fals Chain Works, at Jeffersonville, Ind., to decide to build an addition. Twenty additional forges will be placed in a building 30x100 feet.

The Liggett Spring & Axle Co., Allegheny, Pa., will build a one-story frame addition to its machine shop.

The Wisconsin Malleable Iron Co., Milwaukee, Wis., will build an addition to its warehouse. It will be 74x100 feet, and will cost $3,000.

The Edward P. Allis Co., of Milwaukee, has added to its capacity by purchasing the old Filer-Stowell plant.

The Stowell Mfg. & Foundry Co., located at South Milwaukee, will begin the erection of a large addition which will be used as malleable iron works. It will be 50x150 feet and will cost about $6,000.

The plant of the Fort Pitt Bridge Co., at Canonsburg, Pa., will be considerably enlarged. The company is crowded with orders and finds an addition to the equipment absolutely necessary.

It is reported that arrangements have been completed for the removal to Oshkosh, Wis., of the Search Mfg. Co., of Sheboygan Falls. It will occupy the old plant of the Star foundry and machine shop. The company manufacturers horizontal horse powers, feed cutters, dog powers, feed mills, etc.

The Springfield Drop Forging Co., of Springfield, Mass., recently made extensive improvements in the way of new buildings, new machinery, etc. The new building is 207 feet long by 45 feet wide, two stories. It is connected by a passageway with the old building. In addition there is a forging room 140x40 feet. The company has just placed a 250 h. p. engine and a dynamo of 400-light capacity.

Fires and Accidents:—

One of the buildings of the Union Steel & Iron Co., at St. Joseph, Mo., was wrecked by wind Sept. 5. The damage is estimated at $10,000.

General Industrial Notes:—

The Pittsburg Wire Co., Pittsburg, with mills at Braddock, Pa., turned out in August, 58,523 kegs of wire nails, the largest output for any one day being 3,058 kegs. The product was of average specifications. Only 107 wire nail machines are in use in these works.

The furnaces of the Maryland Steel Co. will be out for a few weeks and will start up when shipments of Cuban ore are made again in sufficient quantity.

The Shelby Steel Tube Co.'s works, at Greenville, Pa., went into operation last week, giving employment to nearly 300 men, after an idleness of two months. The plant is undergoing extensive improvements.

The Hilles & Jones Co., Wilmington, Del., has delivered to the U. S. Navy Yard, Charlestown, Mass., one of its heavy plate straightening machines to straighten plates one inch thick, 72 inches wide. The machine had seven 13-inch diameter rolls and driving was done through tight and loose pulleys.

The Philadelphia Engineering Works will have ready for shipment during the month a 28x48 horizontal cross compound condensing Corliss engine with a 200 h. p. vertical Philadelphia water tube boiler, for A. S. Hay, Yokohama, Japan. The same company have just booked an order for a 44x125 ft. steel plate chimney to be erected in Yokohama, Japan.

The American Machine Tool Works, Cincinnati, has just made a shipment of 19 lathes, 20x36 inches, to its agents at St. Petersburg, Russia. Among orders recently received by this company is one for upward of $10,000 worth of machine tools for the Marine Institute of Warsaw, Russia, and one for 25 assorted machines from London. Orders are now more abundant than at any time during the past 15 months, with a number of departments sold ahead for nearly four months.

Machinery for Russia is being turned out at the works of the Westinghouse Air Brake Works, Wilmerding, Pa. The force of the establishment not working on domestic orders, is busily engaged on these Russian orders. Some time ago the company got an order from the Russian Government for air brakes for the Siberian Railroad. It is in the neighborhood of several millions dollars. It was given on condition that the air brakes be manufactured in that country. With this end in view the Westinghouse people have been busily engaged in turning out tools and machinery for the Russian air brake plant.

Some improvements are being made at Center Furnace, Ironton, O., by the new owner, Mrs. N. H. Kelly. If it is not leased it is probable the owner will operate it.

A number of additional puddling furnaces have been started up at the Ellis & Lessig Steel & Iron Co.'s plant, Pottstown, Pa.

COCHRANE SEPARATORS

"BLUE STEAM."

Ever notice the color, or apparent color effect, of a jet of steam issuing from a pet cock in a live steam main? Was it whitish? That was due to entrained moisture. The bluish color, or perfect transparency, is present only when the steam is dry.

Dry steam (it does not matter how wet it was originally) can always be had using a COCHRANE STEAM SEPARATOR. The mission of these appliances is to take water out of steam--to insure dry steam to engines, whether the steam comes ladened with a small quantity of moisture, or whether it is carrying a "flush" or a "slug" of water.

In our new Separator catalogue, which is fully illustrated, we detail something like 105 different sizes and constructions—building Separators to suit the conditions, being one of our hobbies. Postal requests or catalogues will not be noticed.

HARRISON SAFETY BOILER WORKS,
(Columbia Station), PHILADELPHIA, PA.

ALSO MANUFACTURERS OF THE
COCHRANE HEATERS.

A Philadelphia special says: "A syndicate which includes certain prominent local capitalists has been formed to underwrite the $24,000,000 stock of the new Cambria Steel Co. A meeting of the Cambria Iron stockholders will probably be held during the ensuing week to formally vote on the proposition to 'lease' to the new company. There seems to be no question of an affirmative vote, and with the formation of the underwriting syndicate the success of the plan would seem assured."

Thomas Furnace, at Niles, O., resumed Sept. 1.

The Hazelton Boiler Co., New York City, proprietors and manufacturers of the Hazelton or porcupine boilers, have orders from the following concerns: 500 h. p. for the Morris County Electric Co., Morristown, N. J.; Brookline Gas Light Co., Boston, Mass., 750 h. p.; American Gas Co., Philadelphia, Pa., 200 h. p. for its plant at Port Chester, Westchester Co., N. Y., in which there are already three boilers of the same type; Newark Gas Co., Newark, N. J., 300 h. p. (5th boiler same type); Olcott Falls Co., paper manufacturers, Wilder, Vt., 800 h. p. (3d order); Rochester Gas & Electric Co., Rochester, N. Y., 500 h. p. (10th order), making 4,500 h. p. of these boilers in that very complete plant. The Rochester company has also recently purchased a 500 h. p. Hazelton or porcupine boiler from the Syracuse (N. Y.) Heat & Power Co., which will shortly be moved to Rochester and erected in their electric department. Other orders: Oakland Gas, Light & Heat Co., Oakland, Cal., new steel jacket for 200 h. p. Hazelton boiler erected about 10 years ago and now to be equipped with all the latest improvements; Wagner Palace Car Co., Buffalo, N.Y., steel jackets for five 150 h. p. Hazelton boilers, which were erected in circular brick settings about eight years ago; the Gilbert & Bennett Mfg. Co., Georgetown, Conn., steel furnace casings for two 500 h. p. Hazelton boilers, in their Western plant at Wireton, Ill.; Bartlett, Hayward & Co., engineers and foundres, Baltimore, Md., 100 h. p. for a gas works plant at Jamaica, L. I.; Goodyear's India Rubber Glove Mfg. Co., Naugatuck, Conn., 300 h. p. (3d order); South Middlesex Street Railway Co., South Framingham, Mass., 150 h. p. (3d order); Messrs. Wm. P. Youngs & Bros., planing mill, New York City, 100 h. p., and Messrs. Zahn & Bowly, 50 h. p. for their factory at Rutherford, N. J. All of these boilers are to be equipped with the new brick-lined steel-jacket, with square furnace and square grate surface lately introduced by the Hazelton Boiler Co. This company has a number of men engaged in erecting boilers in different parts of the country, the sales of which were announced in our issues of the last two or three months.

The Harrison Safety Boiler Works, of Philadelphia, have made sales of Cochrane separators recently to the following: Wm. H. Grundy & Co., Bristol, Penn., one 8-inch horz. separator; Chicago Brass Co., Kenosha, Wis., one 4½-inch vert., and one 5-inch horz.; Warren Elec. Light Co., Warren, Pa., one 6-inch horz.; Thos. Evans, Providence, R. I., one 7-inch horz.; Philadelphia Watch Case Co., Riverside, N. J., one 7-inch horz.; J. B. Kendall, Washington, D. C., one 8-inch horz.; Cincinnati (O.) Milling Machine Co., one 5-inch horz.; Adrian (Mich.) Water Co., 3-inch vert., and two 4-inch vert.; F. W. Wolf Co., Chicago, 5-inch horz.; Barr Pumping Engine Co., Philadelphia, 5-inch horz.; Stockton (Cal.) Water Co., 5-inch horz.; Collins White Lead Works, of the National Lead Co., St. Louis, 4½-inch horz.; University of Kansas, Lawrence, Kans., 3-inch and 5-inch horz.; Carnegie Steel Co., Carrie Furnaces, Rankin, Pa., 2 inch vert., and 3-inch horz.; John Cund Brewing Co., La Crosse, Wis., 4-inch vert., 3-inch vert., and 3½-inch horz.; Edwin S. Hartwell Lumber Co., 9-inch horz.; Bureau of Steam Engineering, Washington, D. C., for "Dorothea," 7-inch horz.; Lewiston, (Me.) Bleachery & Dye Works, two 3-inch horz.; Merwin McKaig, Cumberland, Md., 5-inch vert.; Union Metallic Cartridge Co., Bridgeport, Conn., 5-inch and 8-inch horz.; Clearfield Machine Shops, Ltd., Clearfield, Pa., 8-inch horz.; Cornell, Underhill & Boyd, New York City, 6-inch horz.; Kansas City (Mo.) Bolt & Nut Co., one each one and half-inch, 2-inch, 4-inch and 5-inch vert.; Pickands, Mather & Co., Sharpsville, Pa., 6-inch horz.; Cleaver, Paddock & Co., Chicago, 7-inch

The Q & C
Shop
Saws

Cut Everything. - - - -

No. 1. Capacity, 4 inches.
No. 2. " 5 "
No. 4. " 8 "
No. 8. " 3x12 "

POWER SAWING MACHINES

For all purposes.

THE Q AND C

Chicago. New York.

Send for Catalogue.

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick

GOVERNMENT ⁂ STANDARD.

Established 1841. Capacity, 60,000 Per Day; 18,000,000 Per Year.

The First Manufactory of its Kind in the U. S.

Home Office and Works:—MOUNT SAVAGE, Alleganv County, Md.

Branch Offices:—No. 1 Broadway, New York, N. Y.; No. 222 So. Third St., Philadelphia, Pa.; Ferguson Block, Pittsburgh Pa., Stowe, Fuller & Co., 195 Merwin St., Cleveland, Ohio.

OTIS STEEL

"OTIS" FIRE-BOX PLATES A SPECIALTY.

Flange Plates, Ship Plates, Tank Plates, Steel Car Axles and Forgings of all kinds.

Steel Castings from 100 to 75,000 lbs.

Head Office and Works, CLEVELAND, OHIO.

Agencies: NEW YORK, 97 Cedar St. CHICAGO, Old Colony Bldg.
ST. LOUIS, 516 N. Third St. WASHINGTON, Kellogg Bldg.
MONTREAL, J. G. Sibbald, 3 Windsor Hotel.
SAN FRANCISCO, John Woodlock, 26 Beale St.

Conestoga Building. EDWARD E. ERIKSON, PITTSBURG, PA.

Regenerative Gas Furnaces and Water Seal Gas Producers.

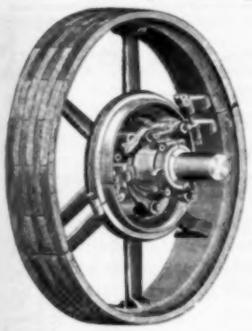
Producer Gas under Tubular Boilers, saving 20 per cent in fuel. NO SMOKE.

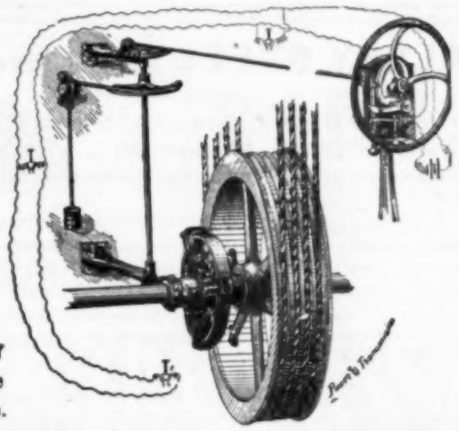
The A B C of Iron, Now 91.

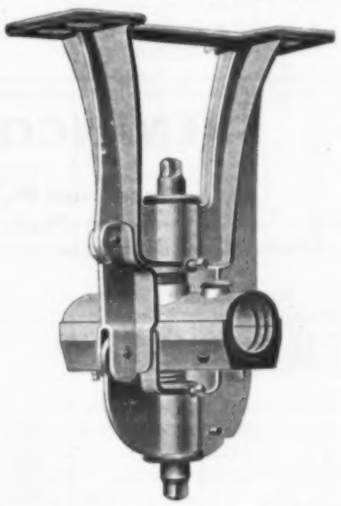
RICE MACHINERY CO., 166-174 South Clinton St., Chicago.

Engineers, Founders and Machinists.

Telephone 4448 Main.







The DODGE American System of ROPE Transmission. Complete Plants Furnished. Try Indurine.

Shafting, Hangers, Friction Clutches. Elevator, Brewery, Sugar Refinery and Oil Mill Machinery, Belting and Mill Supplies.

GENERAL AGENTS FOR THE DODGE INDEPENDENCE WOOD SPLIT PULLEYS.

---

vert.; M. J. Daly, Waterbury, Conn., 5-inch and 7-inch vert.; Phila. & Reading R. R. Co., Reading Terminal, Phila., 16-inch horz.; Bielais Cement Works, Russia, Europe 9-inch horz.; Simmer & Jack Mines, South Africa, two 6-inch horz.; F. Christon & Sons, St. Louis, Mo., 4-inch horz.; Ludowici Roofing Tile Co., Chicago Heights, Ill., 6-inch horz.; Norton Bros., Haywood, Ill., 8-inch vert.; Besloge Consolidated Lead Co. Besloge, Mo., 6-inch vert.; Denver Engineering Works Co., Denver, Col., one 3-inch and one four and half-inch horz. and two 4-inch horz.; Exchange Club, Boston, 4-inch and 6-inch vert.; Crane Co., Chicago, 8-inch horz.; Union Bank Note Co., Kansas City, Mo., three and half inch horz.; M. J. Daly, Waterbury, Conn., 6-inch horz. and two 6-inch horz.; Jordan, Marsh & Co., Boston, 7-inch horz.; Homestead & Hilands St. Ry. Co., Pittsburg, two 8-inch vert.; M. J. Daly, Waterbury, Conn., 4-inch and 3-inch horz.; De La Vergne Refrigerator Machine Co., New York, 5-inch oil ammonia separator; St. Louis (Mo.) Car Co., 10-inch horz.; Colgate & Co., Jersey City, N. J., 5-inch horz.; Western Leather Co., Milwaukee, 5-inch vert.; Clinton Iron & Steel Co., South Side, Pittsburg, one 5-inch vert.; Branen, Dow & Co., Boston, one 5-inch horz.; Colgate & Co., Jersey City, N. J., one 6-inch horz.; Carnegie Steel Co., Edith Furnace, Allegheny, Pa., one 14-inch horz.; Harrisburg Foundry & Machine Works, Harrisburg, Pa., 6-inch vert.; Chicago-Rockford Hosiery

U. BAIRD MACHINERY CO.,

123-125 Water St., **PITTSBURG, PA.,** 124-126 First Ave.

Machine Tools and Supplies. Send for list of Second-hand Tools.

BRASS

Founders and Finishers.

PLATING.

CHAS. L. BASTIAN MFG. CO.,

Franklin and Illinois Sts.

Chicago.

McDOWELL

SEMI-STEEL

PROCESS.

(Cupola metal.) Government tests 36,000 to 49,000 tens. strength.

HANSON McDOWELL,

1522 Monadnock. Chicago.

FOR
ARTISTIC
PRINTING
WRITE
THE
CLEVELAND
PRINTING &
PUBLISHING CO.,
CLEVELAND, O.

Improved Multiple Punch and Gate Shear.

Hilles & Jones Company,

908 Church St., WILMINGTON, DELAWARE.

MANUFACTURERS OF

IMPROVED MACHINE TOOLS

FOR

Bridge and Structural Iron Works, Boiler and Tank Shops, Locomotive and Car Works.

PLATE STRAIGHTENING ROLLS especially designed for ROLLING MILL SERVICE.

Larger and smaller sizes for any capacity Engine, Motor and Pulley driven.

PUNCHES AND SHEARS

OF ALL KINDS

MANUFACTURED BY

The Long & Allstatter Co.,

HAMILTON, OHIO.

Send for catalogue.

SHENANGO VALLEY STEEL CO., New Castle, Pa.,

MANUFACTURERS OF

Bessemer Pig Iron, Steel Billets, Blooms, Black Plate, Tin Plate, Tin Plate Bars, Wire Rods, Market Wire and Wire Nails.

Co., Kenosha, Wis., 8-inch vert.; Omaha & Council Bluffs Bridge & Ry. Co., Council Bluffs, Iowa, 5-inch vert.; John Druecker, Chicago, 4-inch vert.; Fred. W. Wolf Co. Chicago, 4-inch horz.

THERE are a great many shops at the present time using compressed air, and some of these are doing fairly good work with their tools under a pressure of 80 lbs., but it has been found in actual practice, by operating with a pressure of 125 lbs. that the amount of work can be more than doubled, and it is very much better done. This is most marked in the case of riveting, which, by the rapidity with which the rivet is formed, insures the working of the metal at a high heat and the absolute filling of the punched holes.—[Boiler Maker.

Pennsylvania Lines Excursions to Pittsburg for Knights Templar Conclave.

Excursion tickets to Pittsburg account Knights Templar Triennial Conclave will be sold October 8, 9, 10, 11, 12 and 13, via Pennsylvania Lines. For special information inquire of nearest Pennsylvania Line Ticket Agent, or address, C. L. Kimball, Ass't General Passenger Agent, Cleveland, O.

Good Chance to Visit the East at Low Fare.

Persons going to Pittsburg over Pennsylvania Lines on cheap tickets to be sold via that route October 8 to 13, inclusive, account Knights Templar Conclave, will have the privilege of buying low rate excursion tickets from Pittsburg to points in Ohio and Pennsylvania, and to Baltimore and Washington, over the Pennsylvania Route, by depositing excursion tickets with Joint Agent after reaching Pittsburg. Full and particular information furnished in reply to inquiries addressed to nearest Pennsylvania Line Ticket Agent, or to C. L. Kimball, Ass't General Passenger Agent, Cleveland, O.

Low Rates to Pittsburg for Knights Templar Conclave.

Elaborate arrangements are completed for the Knights Templar Conclave at Pittsburg in October. You may enjoy it all by going on low rate tickets to be sold over Pennsylvania Lines October 8 to 13, inclusive. After taking in the sights and festivities, interesting side trips may be made from Pittsburg at small cost by depositing return coupon of Pittsburg tickets with Joint Agent at that place. For particulars apply to nearest Pennsylvania Line Ticket Agent, or address C. L. Kimball, Ass't General Passenger Agent, Cleveland, O.

Change of Time.

Starting Sept. 10, Mt. Vernon & Pan Handle route train No. 28 will leave Cleveland Union Station for Columbus, Cincinnati, Indianapolis and St. Louis at 7:40 P. M., every day in the week excepting Saturday. On Saturdays it will leave at 11:20 P. M. This train carries Pullman sleepers for Columbus and Cincinnati and on Saturday evenings the cars will be ready for occupancy at nine o'clock.